

IMAGE RECORDING DEVICE, IMAGE INPUT DEVICE, AND
DATA PROCESSOR, IMAGE RECORDING METHOD, AND
STORAGE MEDIUM RECORDING IMAGE RECORD CONTROL PROGRAM

5 BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an image
recording device capable of obtaining image information
and image attached information in the memory of a
10 digital camera, a data processor, etc. regardless of
the existence of a host computer, generating a printing
job, and printing out predetermined image data in a
predetermined output control method based on the
generated printing job; an image input device and a
15 data processor; an image recording method; and a
storage medium recording an image record control
program, and more specifically to the technology of
automatically and efficiently performing classifying
printing operations for a personal use and various
20 classifying operations in a print service job using a
plurality of paper discharge trays of the image
recording device when data is printed from a storage
medium (memory).

Related Background Art

25 There has been a conventional photograph print
service as a common method of regenerating image data,
for example, a photograph a user has at hand. This

print service is performed by: a user taking a semitransparent negative cover (negative holder) containing a roll of developed film with the requested number of prints written or marked to a developer through a print shop, etc.; and the developer designating an image to be regenerated (printed) to print only the designated image.

Recently, a photo CD system has been developed. In this system, an image in film is read, and the image data is written on CD-ROM, and is further read from the CD-ROM to regenerate and display on an image display device such as a display, etc. In this photo CD system, a computer system reads the image data recorded on the CD-ROM and outputs on a high quality image printer, thereby obtaining a printed image. Since the high quality image printer is expensive, and it is hard for a personal user to own it, it is common that a user requests a print shop for a print service to obtain a printed image.

When a user requests a print service, he or she normally presents CD-ROM (compact disk ROM) and a memo containing the information (for example, an image number, etc. confirmed using an index print, etc.) designating image data recorded on the CD-ROM.

Furthermore, with the improvement of computer technology and the spread of personal computers and image input devices such as digital cameras, users have

become able to process high precision digital image data. The image data is stored in various image file formats such as the TIFF (Tagged Image File Format which is a high-density bit map image file exchange
5 format), PICT (standard graphics data format for Macintosh), JPEG (Joint Photographic Expert Group which is a static image data compression system), RAW (read and write), etc., and is normally output on a printer connected to a computer owned by a personal user.

10 However, since an output result from a personally owned printer is normally inferior to an output result by a print service of a developer, a print shop, a DPE shop, or a personal computer shop, there are not a few requests for print services of image data stored in an
15 information storage medium.

When a user receives a print service from a print service company, it is recently possible to request to print image data by transmitting the image data through a communications line. However, it is common to
20 present or taking to a service shop with an information storage medium storing image data. In this case, it is necessary to indicate a desired image in the image data stored in an information storage medium, and a user who requests a print service has to notify a service shop
25 of the number or name of the image to specify a desired image in the image data stored in the information storage medium.

On the other hand, the image print service shop receives the instruction written on the memo, etc. of the user who requests the print service, manually selects and prints the user specified image from the image data stored in the information storage medium. Similarly, when image data is transmitted through communications lines, an image is selected and the number of prints is determined based on the instruction contents using a memo, etc.

Normally, since the computer system for the above mentioned print service requires complicated operations by an operator, it is not easy for a common staff of a service shop to correctly select and print an image to be printed. Additionally, it is a laborious operation to actually select and print a user desired image data from the image data stored in the information storage medium, thereby limiting the actual printing time.

Under the situation, a method of quickly obtaining a printed image by automatically specifying a desired image from among a plurality of images stored in an information storage medium has recently been suggested. The suggested contents are described below by referring to FIGS. 38A, 38B, 38C and 39.

FIGS. 38A to 38C show examples of the configurations of a storage medium 5001 as an information storage medium. In FIG. 38A, the storage medium 5001 is mapped into four independent areas, that

is, a reserved area 5002, a file allocation table area 5003 (hereinafter referred to as a FAT area), a root directory area 5004, and a file area 5005.

The reserved area 5002 stores, for the storage medium 5001, the size of the reserved area 5002, the size of the file allocation table area 5003, and the number of entries in the root directory area 5004. The file allocation table area 5003 stores the use of the storage medium space in the file area 5005 of the storage medium 5001. The root directory area 5004 stores directory entry information indicating the information such as a file name, a size, a position, etc. stored in the storage medium 5001. The file area 5005 stores image forming instruction data and actual image data.

For convenience of explanation, the image forming instruction data is expressed as DPFxxx as shown in FIG. 38B, and the image data is expressed as IMGxxx as shown in FIG. 38C, where xxx indicates characters or numerals for identification of plural pieces of image forming instruction data and image data.

Next, as an example of a conventional print control process, a process of generating and outputting a desired print image by a printing device using image data recorded in the storage medium 5001 as shown in FIGS. 38A to 38C are described below by referring to the flowchart shown in FIG. 39.

In FIG. 39, in step S801, it is confirmed whether or not the storage medium 5001 has been set in the data reading unit in the printing device (refer to FIGS. 10 and 14 described later). If it is confirmed that the storage medium 5001 has been set in the data reading unit, control is passed to step S802. In step S802, it is checked in the data reading unit whether or not there is a file having the name of DPFxxx by referring to the contents of the root directory area 5004 stored in the storage medium 5001. If there is no DPFxxx file, the printing device terminates the operation.

If there is a DPFxxx file, control is passed to step S803, and the first DPFxxx file (FIG. 38B) in the file area 5005 is read. In step S804, the first file name IMGxxx indicated in the read DPFxxx file is read. In step S805, the image data (FIG. 38C) stored in the file IMGxxx read in step S804 is read.

In step S806, an image generating process is performed by an image generating unit (not shown) in the printing device on the image data read in step S805, and bit map image data is generated. The generated bit map image data is printed in step S807 by the image output unit in the printing device.

In step S808, it is checked whether or not there is another IMGxxx indicated in the DPFxxx file being read (refer to FIG. 38B). If another IMGxxx is indicated, then control is passed to step S809. If

there is no other IMGxxx indicated, control is passed to step S810.

In step S809, the IMGxxx file is read, and control is passed to step S805. In step S810, the storage
5 medium 5001 is accessed. If there is another DPFxxx file, then control is passed to step S811, the next DPFxxx file is read, and control is passed to step S804. If there is no other DPFxxx files, then the operation of the printing device terminates.

10 However, there has been the following problems in the above mentioned conventional system.

For example, in a photo print service, in the embodiment in which an information storage medium such as a negative cover, CD-ROM, etc. storing image data is
15 directly taken to a service shop in the above mentioned conventional technology, a client has to go directly to a service shop, etc. to request them for prints, and has to go to the shop again to obtain requested prints, thereby requiring a considerable time and laborious
20 steps. Furthermore, when a user requests a service shop for a print service, he or she has to specify a desired image to be printed, and write the number of prints, etc. on a memo, etc. in a predetermined format, and the staff of the service shop has to follow the
25 information written on the memo in selecting the image to be printed, etc. As a result, the staff also requires a laborious operation.

In addition, when a print is made through an information storage medium, image data is stored in an information storage medium such as CD-ROM, etc., and the contents of the data have to be checked in advance, and prepares a memo.

When image data is transmitted through a communications line, a user does not have to go to a service shop to request a print service, but has to specify an image to be printed and the number of prints by preparing a memo. Therefore, a staff at the service shop still requires some laborious steps.

On the other hand, with the recent spread of personal computers, a large number of common users have installed their own personal computers at home. In addition, without personal computers, users are allowed to realize connections to Internet using domestic electric appliances such as a TV set, a game machine, etc. having the functions of personal computers. Furthermore, with the remarkable spread of mobile terminals, data has been transmitted and received through portable handy phones, etc. thus, not only computers but also all media have been interconnected regardless of cable or radio.

That is, when a printing process is performed using electronic image data without using a physical item such as a negative, etc., any user can easily issue an instruction to make a print through a personal

computer, a portable handy phone, etc. at home.
Accordingly, in making copies of a photograph, etc., a
user can request from home any service shop to make
copies.

5 Recently, computers are interconnected through a
LAN (local area network), and a LAN connection can be
made not only to a printer, but also to various other
peripheral devices such as a multifunction image
processing device, etc. having copying and facsimile
10 functions. Therefore, an image recording device has
realized a method of discharging paper in various paper
discharge modes satisfying all needs of a plurality of
users sharing a network, for example, a user separate
fixing (mail box) mode, a user separate automatic (job
15 separate) mode, a sort mode, a stack mode, etc.

 In the user separate fixing mode and the user
separate automatic mode, a unique name is assigned to
each paper discharge tray of an image recording device,
and the paper discharge trays are discriminated based
20 on the names. The difference between the modes is
described below. In the user separate fixing mode,
paper is discharged by registering in advance an
identification name for each paper discharge tray of an
image recording device, and specifying the
25 identification name as a selected paper discharge tray
when a printing process is performed, thereby
specifying a selected paper discharge tray and

classifying printing by a user easily discriminated
name (refer to Japanese Patent Application Laid-Open
No. 2001-80175). On the other hand, in the user
separate automatic mode, for example, a user name of a
5 print requesting user is dynamically registered as an
unused and available paper discharge tray during a
printing process, and the paper discharge tray
registered when the printing process is first performed
is retrieved to discharge paper to the paper discharge
10 tray if the same user specifies a print request again,
thereby appropriately performing a printing job for
each user without prompting a user to specify a correct
selected paper discharge tray when the printing process
is performed (refer to Japanese Patent Application
15 No. 11-264645).

In the sort mode, a print of a printing job is
sorted into the specified number of paper discharge
trays using a series of paper discharge trays. In the
stack mode, paper is continuously discharged to the
20 same paper discharge tray in a printing job until it is
full. When it is full, the paper discharge tray is
switched to the next highest priority paper discharge
tray to which paper is discharged. These paper
discharge methods are well known.

25 As described above, when a printing process is
performed by a host computer through a printer driver,
various settings are made by selecting a paper

discharge mode, etc., and various processes can be performed in various paper discharge modes. However, when a printing process is performed using a digital camera or performed directly from an information storage medium such as a memory stick, etc., there are no means for specifying a medium for performing the printing process or for specifying a selected paper discharge tray, thereby having a user manually classifying prints, and requiring a laborious and time-consuming process in classifying prints for personal use, or various classifying operations in a print service operations for each clients, etc.

SUMMARY OF THE INVENTION

The present invention has been achieved to solve the above mentioned problem. A first object of the present invention is to automatically realize a paper discharge method satisfying all needs of users in performing a printing process from a storage device in an external device such as a digital camera, etc. or from a storage medium such as a memory card, etc. regardless of the existence of a host computer, by issuing an instruction to perform a printing process with a paper discharge mode selected through an existing device such as a digital camera, a printing device, etc., and to efficiently perform various classifying operations such as classification of prints

for each personal user or for each client.

A second object of the present invention is to realize an image recording method of requesting any service shop from home to copy any number of prints of
5 desired image data by allowing an image recording device to be notified of necessary information by adding information such as an image data storage location, a print destination, the number of prints, a paper discharge method, a print reception method, a
10 payment method, etc. to the electronic information communicated between an image recording device such as a printer, etc. and an external device such as a personal computer, a mobile terminal, a digital camera, etc. in a print service such as making copies of a
15 photograph, etc.

An object accompanying the second object of the present invention is to provide a service system of allowing a user to specify the delivery of a print service according to the above mentioned electronic
20 information to a place where an image recording device is installed, a nearest service shop (a convenience store, a developer, a personal computer shop, etc.) or to home, etc., thereby realizing the convenience of users and satisfying the need of users.

25 An object further accompanying the second object of the present invention is to realize an efficient print service in which a print instruction is all

stored in the electronic information, a staff of a service shop is free of selection of an image according to a user memo, etc., thereby reducing a laborious steps in a printing process.

5 An object further accompanying the second object of the present invention is to automatically realize a paper discharge method satisfying all needs of users in performing a printing process directly from a host computer in a network, a storage device in an external
10 device such as a digital camera, etc. or directly from a storage medium such as a memory card, etc. without an instruction of the host computer, by issuing an instruction to perform a printing process with a paper discharge mode selected through an existing device such
15 as a digital camera, a printing device, etc., and also to efficiently perform various selecting operations such as classification of prints for each personal user or for each client.

 To attain the above mentioned objects, the image
20 recording device according to the present invention includes: designation means for designating a name of each paper discharge tray; and determination means for determining a paper discharge tray of paper recording an image based on image data read from the storage
25 means according to attached information read from the storage means for storing image data and image data attached information, and the name designated by the

designation means.

An image recording method according to the present invention includes: a designating step of designating a name of each paper discharge tray; and a determining
5 step of determining a paper discharge tray of paper recording an image based on image data read from the storage means according to attached information read from the storage means for storing image data and image data attached information, and the name designated in
10 the designating step.

A computer-readable program according to the present invention includes: a designating step of designating a name of each paper discharge tray; and a determining step of determining a paper discharge tray
15 of paper recording an image based on image data read from the storage means according to attached information read from the storage means for storing image data and image data attached information, and the name designated in the designating step.

A storage medium according to the present invention stores a computer-readable program including:
20 a designating step of designating a name of each paper discharge tray; and a determining step of determining a paper discharge tray of paper recording an image based
25 on image data read from the storage means according to attached information read from the storage means for storing image data and image data attached information,

and the name designated in the designating step.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a concept of an example of
5 classifying an output image for each service window in
a printing service job to explain an operation system
of printing out an image photographed by a digital
camera in a user separate fixing mode according to a
first embodiment of the present invention;

10 FIG. 2 shows the concept of an example of
designating an identification name of a destination of
each image by a digital camera, and classifying an
output image by each identification name based on the
contents of a memory card storing the image to explain
15 the operation system of printing out an image
photographed by a digital camera in a user separate
fixing mode according to the first embodiment of the
present invention;

FIG. 3 is a block diagram showing a directory
20 structure of a storage medium according to the first
embodiment of the present invention;

FIG. 4 shows the concept for explaining the
contents of the data described in an image forming
instruction file according to the first embodiment of
25 the present invention;

FIG. 5 is a plan view showing an example of a UI
screen for registration of the name (identification

name) of a paper discharge tray by a user when an operation is performed in a user separate fixing mode according to the first embodiment of the present invention;

5 FIG. 6 is a flowchart of a process procedure of registering the name (identification name) of a paper discharge tray by a user when an operation is performed in a user separate fixing mode according to the first embodiment of the present invention;

10 FIG. 7 is a plan view showing an example of a UI screen used by a user to issue a print instruction on the image recording device according to the first embodiment of the present invention;

15 FIG. 8 is a flowchart of the print execution instructing procedure in the image recording device according to the first embodiment of the present invention;

20 FIG. 9 is a block diagram of a configuration of the circuit of the image recording device according to the first embodiment of the present invention;

25 FIG. 10 is a sectional view of an outline of an internal configuration of the image recording system configured by the image recording device and an option unit according to the first embodiment of the present invention;

 FIG. 11 is a block diagram showing an interface of each controller in the image recording device shown in

FIG. 9 according to the first embodiment of the present invention;

FIG. 12 shows the contents and the direction of a signal communicated between a video controller and an engine controller shown in FIG. 11 according to the first embodiment of the present invention;

FIG. 13 shows serial communications performed by an option controller, a video controller, and an engine controller shown in FIG. 11, and the contents and the direction of a signal according to the first embodiment of the present invention;

FIG. 14 is a block diagram of a detailed configuration of a video controller shown in FIG. 11 according to the first embodiment of the present invention;

FIG. 15 is a memory map showing the contents of the memory shared with the video controller reserved in a RAM provided in the option controller shown in FIG. 11 according to the first embodiment of the present invention;

FIGS. 16A and 16B show the type of the procedure of obtaining detained information about each paper supply/discharge option unit by issuing a command status based on the basic status of an option unit according to the first embodiment of the present invention;

FIG. 17 is a flowchart of an embodiment of a

method of obtaining option information through an option controller shown in FIG. 11 according to the first embodiment of the present invention;

FIG. 18 is a block diagram showing a data flow in the image recording process according to the first embodiment of the present invention;

FIG. 19 is a memory map showing the map relating to the page table in the image memory shown in FIG. 14 according to the first embodiment of the present invention;

FIG. 20 is a memory map showing the map relating to the job control table in the RAM shown in FIG. 14 according to the first embodiment of the present invention;

FIG. 21 is a memory map showing the map relating to the engine status table in the RAM shown in FIG. 14 according to the first embodiment of the present invention;

FIG. 22 is a flowchart of the process procedure of the image recording device receiving print data until the completion of the printing process according to the first embodiment of the present invention;

FIG. 23 is a flowchart of the procedure of retrieving a paper discharge tray in the user separate fixing mode according to the first embodiment of the present invention;

FIG. 24 is a flowchart of the procedure of

updating information about each paper discharge tray according to the first embodiment of the present invention;

FIG. 25 is a flowchart of the procedure of the state displaying process of each paper discharge tray according to the first embodiment of the present invention;

FIG. 26 shows the concept of displaying the delivery state (loading information) at each paper discharge tray by the panel unit of the image recording device according to the first embodiment of the present invention;

FIG. 27 shows the concept of displaying in detail an image loaded at a specific paper discharge tray by the panel unit of the image recording device according to the first embodiment of the present invention;

FIG. 28 is a plan view of the index print of an output image output at each paper discharge tray when a printing process is performed in the user separate fixing mode according to the first embodiment of the present invention;

FIG. 29 is a plan view of the print output of the information about the loading job at all paper discharge trays according to the first embodiment of the present invention;

FIG. 30 is a plan view of the print output of the information about the loading job at a specific paper

discharge tray according to the first embodiment of the present invention;

FIG. 31 shows the operation system of printing out an image read by a digital camera in the user separate fixing mode, and shows the concept of an example of designating the identification name of the destination of each image by a digital camera, and classifying an output image for each identification name based on the contents of the memory card storing the information according to a second embodiment of the present invention;

FIGS. 32A and 32B are plan views showing an example of a UI screen on which a user issues an instruction to perform a printing process using a digital camera according to the second embodiment of the present invention;

FIGS. 33A and 33B are plan views showing an example of the UI screen on which the user issues an instruction to perform the printing process using the digital camera according to the second embodiment of the present invention;

FIG. 34 is a flowchart of the procedure of the print execution instructing process in the data process unit of a digital camera and an image recording device according to the second embodiment of the present invention;

FIG. 35 shows the concept of the digital camera

showing a delivery status (loading information) of each paper discharge tray of the image recording device to which the camera is attached according to the second embodiment of the present invention;

5 FIG. 36 shows the concept of the digital camera displaying in detail an image loaded at a specific paper discharge tray of the image recording device to which the camera is attached according to the second embodiment of the present invention;

10 FIG. 37 shows the concept of the operation system printing out in the user separate fixing mode an image read by a host computer from the memory card in a variation of the first embodiment of the present invention;

15 FIGS. 38A, 38B, and 38C are memory maps showing a conventional technology, and shows an example of a configuration of a storage medium as an information storage medium;

20 FIG. 39 shows the conventional technology, and is a flowchart of the procedure of a print control process in which a desired print image is generated and output by using the image data recorded in a storage medium;

25 FIG. 40 shows the concept of an operation system in which the user issues an instruction to reserve a printing process on the image data stored in a host computer to a remote printer connected through Internet, and issues an explicit instruction to perform

the printing process in a panel operation to the
printer when the user visits a place where the printer
is installed, and the printer prints out the image data
in the user separate fixing mode at the instruction
5 according to a third embodiment of the present
invention;

FIG. 41 is an event trace view showing the
procedure of the operation system in which the user
issues an instruction to reserve a printing process on
10 the image data stored in a host computer to a remote
printer connected through Internet, and issues an
explicit instruction to perform the printing process in
a panel operation to the printer when the user visits a
place where the printer is installed, and the printer
15 prints out the image data in the user separate fixing
mode at the instruction according to the third
embodiment of the present invention;

FIG. 42 shows the operation system of printing out
an image in the user separate fixing mode, and shows
20 the concept of an example of classifying an output
image for each identification name based on the
contents of the image forming instruction file
designated by the identification name of the
destination of each image file according to the third
25 embodiment of the present invention;

FIG. 43 is a plan view showing an example of a Web
browser UI screen on which a user issues a print

request to a printer connected by the host computer through Internet according to the third embodiment of the present invention;

FIG. 44 is a plan view showing an example of a Web browser UI screen on which an image forming instruction file is edited to issue a print request through Internet according to the third embodiment of the present invention;

FIG. 45 is a plan view showing an example of an UI for the user registering the name of a paper discharge tray (identification name) when the process is performed in the user separate fixing mode according to the third embodiment of the present invention;

FIG. 46 is a plan view of an example of a UI screen on which a print instruction is issued in a printer panel operation based on an image forming instruction file and an image file downloaded from the host computer according to the third embodiment of the present invention;

FIG. 47 is a flowchart of the procedure of the process performed when the user issues an instruction to perform a printing process by operating the panel of a printer according to the third embodiment of the present invention;

FIG. 48 shows the concept of displaying the delivery state (loading information) at each paper discharge tray of the panel unit of the image recording

device according to the third embodiment of the present invention;

FIG. 49 shows the concept of displaying in detail an image loaded at a specific paper discharge tray of the panel unit of the image recording device according to the third embodiment of the present invention;

FIG. 50 is a plan view of the print output of the information about the loading job at all paper discharge trays according to the third embodiment of the present invention;

FIG. 51 is a plan view of the print output of the information about a specific paper discharge tray according to the third embodiment of the present invention;

FIG. 52 shows the concept of the operation system in which the user issues an instruction to perform a printing process on the image data stored in a host computer to a remote printer connected through Internet, and the printer prints out the image data in the user separate fixing mode at the instruction according to a fourth embodiment of the present invention;

FIG. 53 is an event trace view showing the procedure of an operation of the system in which the user issues an instruction to perform a printing process on the image data stored in a host computer to a remote printer connected through Internet, and the

printer prints out the image data in the user separate fixing mode at the instruction according to the fourth embodiment of the present invention;

FIG. 54 shows the concept of an operation system
5 in which the user issues an instruction to perform a printing process by designating a storage position of image data stored in a remote host computer using the panel unit of a printer, and the printer prints out the image data in the user separate fixing mode at the
10 instruction according to a fifth embodiment of the present invention;

FIG. 55 shows an event trace view showing the procedure of an operation system in which the user issues an instruction to perform a printing process by
15 designating a storage position of image data stored in a remote host computer using the panel unit of a printer, and the printer prints out the image data in the user separate fixing mode at the instruction according to the fifth embodiment of the present
20 invention;

FIG. 56 shows the concept of the operation system in which the user issues an instruction to perform or reserve a printing process from a portable terminal, and a printer performs a predetermined printing process
25 in a variation 1 according to the third to fifth embodiments of the present invention;

FIG. 57 shows the concept of the operation system

in which a server providing a print service is not configured in the same LAN as a printer in a variation 2 according to the third to fifth embodiments of the present invention; and

5 FIG. 58 shows the concept of the operation system in which a printer has the function of receiving a print request and a print reservation request from a host computer, or managing a print setting process, etc. in a variation 3 according to the third to fifth
10 embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to drawings, embodiments of the present invention will be described in detail as
15 follows.

(First Embodiment)

FIG. 1 and FIG. 2 depict an operation system to print-output images shot with a digital camera under user separate fixed mode in the first Embodiment of the
20 present invention.

FIG. 1 depicts an example to execute classification of output images on the basis of destination of windows in print service operations, and FIG. 2 depicts an example to designate output
25 destination by a distinguishing name in advance on image-by-image basis so as to execute classification of output images on the basis of distinguishing name

according to contents of memory cards where those pieces of information are stored.

FIG. 1 and FIG. 2 depict an example to mount onto an image recording device 102 a storage medium 110 such as a memory card, etc., which is detachable-attachable and stores image data shot with the digital camera 1 to execute printing based on that information in respective operation systems.

These storage medium 110 stores as shown in FIG. 2, attached information related to respective images other than image data of shot images. For these pieces of information, as information to be automatically stored, there are image number, photographed date, formatting format of an image file, etc., and as information to be inputted by a user after shooting session, there are title, trimming information, rotation information, and number of print sheet, etc. Otherwise, names of people who need distribution as distribution users so that the same image is delivered to a plurality of person as in the case of printing as well as names of their offices may be inputted there.

Moreover, into the storage medium 110, not only the above described image attached information but also information on printing indication may be stored. For this printing indication information, there are graphic mode, color mode, sheet discharging mode, number of sheet printing, etc. to become outputting printer

information and control information at the time of printing and respective detailed setting information, etc. shall be included.

According to respective examples in FIG. 1 and
5 FIG. 2, printing processing to be executed from an image recording device 102 via the storage medium 110 will be sequentially described as follows.

Firstly, the example of FIG. 1 will be described.

In FIG. 1, a print-service trustee (an ordering
10 customer) submits a memory card 110 where image data shot by a digital camera 1 is stored to any of windows 3 to 6 for print service so as to request output of image data contained in the memory card 110. In this example, "kakky" is in charge of a print service window
15 3 where a print service is trusted.

In this example, a print service is trusted to the window 3, which "kakky" is in charge of and will submit the memory card 110 which the print service client has left to a deliverer who collect it periodically via
20 windows so as to be transported to a place where special printing laboratory (image recording device) 102 exists.

For memory cards 110 transported in from the print service windows 3 to 6, the image output operators
25 output images stored in respective memory cards 110. Here, the image output operators execute printing output under the above described "user separate fixing"

mode in order to efficiently proceed with classification for each print service window when the images are outputted.

5 In order to execute print outputting under "user separate fixing" mode, distinguishing name needs to be registered on respective sheet discharging ports 251 to 257 of the printing laboratory 102, but here the name of clerks in charge of respective print service windows shall be registered in advance as the distinguishing
10 names. In the example of FIG. 1, "kakky" is registered in "Bin1", "yuichi" in "Bin2", "maekawa" in "Bin3", and "hkita" in "Bin4".

When images are outputted on the memory card 110 left at the print service window 3 where "kakky" is in
15 charge, printing indication is executed with "kakky" to be designated as the destination of outputting. For the printing jobs designated to "kakky" being the destination of outputting, the printing laboratory 102 execute predetermined image recording processing, and
20 according to name registration information of the above described respective paper discharge trays 251 to 257, the image output result is sheet-discharged to "Bin1" which is registered under the distinguishing name of "kakky". Also for image outputs on the memory cards
25 left by clerks in charge of the other windows, the names of the clerks in charge are likewise designated as the output destination so that printing is

proceeded, and thus image output classification for each clerks in charge of windows can be executed.

When all image outputting on the memory cards 110 collected from the print service windows is completed, the memory cards 110 are again returned to respective windows 3 to 6 together with the outputted images allocated into respective paper discharge trays 251 to 257 for clerks in charge of respective windows via the deliverers. In the example of FIG. 1, an output image 10 sheet-discharged to "Bin1" together with a memory card 110 to be its source is conveyed to the window 3 of which "kakky" is in charge.

Thus, making the print service operation classifiable under "user separate fixing" mode, classification operations taking place at the time of large quantities of image output operation can be executed automatically without depending on manual processes so that efficiency in the entire print service operation will become improvable.

Next, an example in FIG. 2 will be described.

In FIG. 2, "user separate fixing" as sheet discharging mode, any distinguishing name for each image as output destination, and any necessary copy value for each image as number of copies is stored in the storage media 110 such as a memory card, etc. with input operations from a user. In FIG. 2, memory contents of the memory card 110 are depicted for

example by an image with image number "000-0000" having distinguishing name of its output destination being "baseball club" and necessary number of prints being "9".

5 In receipt of printing indication from a user, the (not shown) job generation unit of the printing laboratory 102 reads stored information in the memory card 110 to start preparation of the job based on the "user separate fixing" mode designated as sheet
10 discharging mode. In the case where the print job by way of "user separate fixing" mode is formed, the "distinguishing name" designated as output destination will become judgment clue to execute classification processing for each image. For the example in FIG. 2,
15 "baseball club", "hardball tennis club", "softball tennis club", "swimming club male", and "swimming club female", etc. being "output destination" for each image is used as distinguishing name for classification processing. Here, images may be set for operations
20 without any "output destination" being designated.

 In the processing for forming print jobs, with "user separate fixing" mode being designated, the distinguishing name having been designated as "output destination" for each image is treated as the sheet
25 discharging destination and the value designated as "number of copies" is added to the printing indication information for each image.

When preparation of a print job is completed, the job generation unit delivers that print job to the data analysis portion. The image recording device 102 analyzes contents of the print job based on the formed print job to execute predetermined print processing according to those contents. In the case of the print job as in the example of FIG. 2, as the page information on the number covering the value designated as the number of copies is copied, sheet discharge destination for each image will be determined so that the outputs are classified into the paper discharge tray registered under the same name as the distinguishing name designated as the sheet discharge destination. For example, in case of output destination being "baseball club", the sheet discharging port is Bin1 and nine copies of the image with image number being "000-0000" is determined to be sheet-discharged.

Here, respective paper discharge trays 251 to 257 of the image recording device 102 shall be registered by distinguishing names in advance, and that registration may be inputted by way of panel operation from the image recording device 102 or may be made to be stored in the memory card 110 as one of printing indication information so that after the memory card 110 is mounted onto the image recording device 102 the image recording device 102 reads the registered

contents in from the memory card 110 for setting.

As for images for which feeding-discharging destinations have been determined, predetermined print processing is executed sequentially, and as in the

5 example of FIG. 2, sheets for designated number of copies of each image covering the output results of images with sheet discharging destination being designated under distinguishing name of "baseball club" are sheet-discharged into the paper discharge tray

10 "Bin1", sheets for designated number of copies of each image covering the output results of images with sheet discharging destination being designated under distinguishing name of "hardball tennis club" are sheet-discharged into the paper discharge tray "Bin2",

15 sheets for designated number of copies of each image covering the output results of images with sheet discharging destination being designated under distinguishing name of "softball tennis club" are sheet-discharged into the paper discharge tray "Bin3",

20 sheets for designated number of copies of each image covering the output results of images with sheet discharging destination being designated under distinguishing name of "swimming club male" are sheet-discharged into the paper discharge tray "Bin4", and

25 sheets for designated number of copies of each image covering the output results of images with sheet discharging destination being designated under

distinguishing name of "swimming club female" are
sheet-discharged into the paper discharge tray "Bin5".

Thus, also in the case where operations are
executed by an individual, the print processing is
5 executed under "user separate fixing" mode so that
without taking the position of the sheet discharging
destination into consideration the sheet discharging
destination can be designated under distinguishing
names and necessary copies for each image can be
10 designated. In addition, those designations are made
to be stored into the memory card 110 so that only
necessary number of necessary images can be outputted
with printing indication at a time.

So far, a concept on an operation system to print
15 and output images photographed with the digital camera
1 by way of "user separate fixing mode" via the storage
medium 110 has been described.

As follows, embodied examples on the above
described concept will be described further in detail
20 as follows with reference to block diagrams and
flowcharts or the like.

FIG. 3 shows an example of directory structure of
information storage medium 110. In FIG. 3, image data
and image attached data are disposed in a lower layer
25 of a root directory (ROOT) 11 respectively as image
file 15 and Image forming instruction file 12. The
image file 15 is processed at any directories 13 and 14

disposed in the lower layer of the root directory 11
with instructions of the user or automatic settings of
the job generation unit and is constructed
hierarchically. This hierarchy may be multiplex and
5 does well if it provides with consistency with path
designation of the image file described in the Image
forming instruction file 12. Likewise the Image
forming instruction file 12 may lack a (not shown)
predetermined directory between itself and the root
10 directory 11 but does well if the job generation unit
is disposed in a detectable position.

FIG. 4 shows an embodied example of data contents
described in the above described Image forming
instruction file 12. As shown in FIG. 4, onto the
15 Image forming instruction file 12, common information
in image data to be stored in the storage medium 110
(to be referred to image common information) 12-1 and
information inherent to each image data (to be referred
to as image inherent information) 12-2 are described.

20 In the image common information 12-1 a version
name of the Image forming instruction file 12, name of
apparatus model, date and time when the Image forming
instruction file has been saved, user information (user
name, address, and telephone number, etc.), print
25 output system (graphic mode, color mode, and sheet
discharging mode, etc.), distinguishing attributes
(classification attributes) under user separate

automatic mode, etc. are described. On the other hand,
in respective image inherent information 12-2 the
product ID, the print class, the number of print,
format form of the image file, relative path of the
5 image file, image attached information (date, panel
serial number, title, trimming information, rotation
information, etc.) are described. This information
could be one automatically described in accordance with
settings at the time of image input or could be one
10 described by a user instructing clearly after image
input.

In the case where the user has indicated printing,
the job generation unit detects the above described
Image forming instruction file 12 from the storage
15 media 110 and analyzes contents of the detected Image
forming instruction file so as to prepare print jobs
based on that analyzed content.

FIG. 5 depicts an example of UI (user interface)
for a user to register a paper discharge tray name
20 (distinguishing name) at the time of operation under
user separate fixing mode. In order to operate the
image recording device 102 under the user separate
fixing mode, it is necessary to register the
distinguishing names for respective paper discharge
25 trays 251 to 257 of the image recording device 102 in
advance. When the distinguishing names are registered
for respective paper discharge trays 251 to 257, user

interface 16, shown in FIG. 5 for example, displayed in the display part of the panel part 104 of the image recording device 102 (reference should be made to FIG. 2) can be used for registration.

5 In FIG. 5, respective bins 1 to 7 (Bin1 to Bin7) of the fixed paper discharge trays 251 to 257 set at the EEPROM (a ROM electrically erasable/writable) of the printer in advance such as "Bin1", "Bin2" or "Bin3" are registered under names that the user can recognize
10 easily such as "kakky", "yuichi", "maekawa" and "hkita" respectively. As names to be registered for the paper discharge tray under user separate fixing mode, user name, group name, and service shop name or the like are effective.

15 The flow chart in FIG. 6 shows a processing procedure to register the paper discharge tray name (distinguishing name) at the time of operation under user separate fixing mode. Incidentally, in descriptions as follows, reference character S placed
20 at the top of reference symbols denotes a processing step.

 In FIG. 6, at first it is judged whether or not a user has designated registration of paper discharge tray name (S1). In S1, in the case where the
25 registration of paper discharge tray name has been designated, while waiting for an input from the user, it is judged whether or not the paper discharge tray

name has been edited (S2). In S2, in the case where the paper discharge tray name has been edited, the designated name is registered at a corresponding paper discharge tray (S4).

5 In the case where registration of paper discharge tray name has not been designated in S1, processing of the paper discharge tray name registration ends. In addition, in S2, in the case where paper discharge tray name has not been edited in S2, in S5 it is judged
10 whether or not editing of paper discharge tray name has been cancelled, and if not yet cancelled, the step goes back to the processing of S2. In S5, if cancelled, the processing of registration of paper discharge tray name ends.

15 FIG. 7 shows an example of user interface UI 17 to make printing indication based on data inside the memory card 110 when the memory card 110 is inserted into the memory card insertion port 413 (reference should be made to FIG. 2) of the image recording device
20 102. Printing from the storage medium 110 such as a memory card may start at once with its insertion as a trigger, or as in the case having been shown in the example of FIG. 1, printing may start subject to user's setting and instruction so that designations on
25 printing can be made. In addition, as in the case having been shown in the example of FIG. 2, designation on sheet discharging mode, designation on output

destinations for respective images and designation on
number of copies for respective images or the like may
be referred to data contents inside the memory card and
the other designations and printing indication only may
5 be executed by the image recording device. FIG. 7
shows an input example shown in an example of FIG. 1 in
particular.

As shown in FIG. 7, the display part of the panel
part 104 of the image recording device 102 provides
10 with "image designation" and "media" being selectable,
and as for "output destination" and "number of copies",
designation on whether reference should be made to data
contents or designation should be made clearly without
reference to data contents can be designated with check
15 boxes. Moreover, in the case where "output
destination" and "number of copies" are clearly
designated without reference to data contents, desired
output destinations as well as desired numbers of
copies can be designated respectively.

20 For "image designation", for example, whether all
images inside the memory card are printed or a portion
thereof is printed, or a page of an index print showing
a list of selected images is printed, is selected.

In "media", it is selectable onto what the image
25 should be printed. In some cases, the image recording
device 102 could be a machine exclusive for photos, but
in the present embodiment, the apparatus shall be

printable for a plurality of media, and ordinary paper, postcard, photo, coated paper, OHP (overhead projector) sheet or the like can be selected, and in the input example of FIG. 7, "photo" has been selected.

5 In the case where "output destination" is clearly designated, all paper discharge tray names (distinguishing names) having been registered in respective paper discharge trays in advance are displayed as selection items, and among them a paper
10 discharge tray of an image selected at "image designation" can be selected under distinguishing name corresponding with desired classification purposes. In the input example of FIG. 7, "kakky" is selected.

 In case of clearly designating "number of copies",
15 desired number of output copies for images selected at "image designation" can be selected. In the input example of FIG. 7, "as for number of copies, reference should be made to contents of data" is designated, and therefore number of copies for images selected under
20 "image designation" is not designated clearly.

 After executing these selections, the user (operator) pushes "OK" button, information inside the memory card 110 is read out so that printing starts with the above described settings.

25 The flow chart in FIG. 8 shows a processing procedure in the case where execution of memory card printing is instructed as described above from the user

(operator).

In FIG. 8, when print execution is instructed from the user, the data readout part inside the memory card insertion port 413 starts data take-in from the predetermined storage medium 110 so as to investigate whether or not communication with the storage medium 110 to be mounted onto the data readout part is executable (S101). In S101, in the case where communication with the storage medium 110 has been judged to be not executable, the warning message such as "please mount a memory card" or the like is displayed so that the user is notified that no communication connection is implemented from the storage medium 110 (S107) and the printing execution indication processing ends.

In S101, if communication with the storage medium 110 is executable, capability information (number of paper discharge trays, number of sheet feeding ports, feeding paper size and type or the like) of the image recording device 102 is acquired (S102). In addition, in the next S103, the Image forming instruction file 12 is detected from the storage medium 110 and its contents are read in and reference is made to image data, image attached data and print setting data or the like. From those referred contents, in the next S104, it is judged whether or not printing as designated is executable, and in S104, if printing is not executable,

warning message such as "user separate sheet discharge cannot be executed," or the like is displayed, display corresponding with the contents is executed, the user is notified that printing as designated is not executable (S107), and the printing execution indication processing ends. In S104, if printing is executable, the step goes forward to processing of next S105 and onwards.

In S105, considering print setting data, header data for a print image is added based on image common information 12-1 described in the read-in Image forming instruction file 12 in S103 so that the print job is formed. Moreover, each image inherent information 12-2 described in the Image forming instruction file 12 will be read in, and at first, in S106 the leading image inherent information is read in, and thereafter, processing to prepare image control data of S109 as well as processing to prepare image data based on the image file relative path designation of S110 is executed, and if other image inherent information exists in S111, the step goes back to S108 so that the next image inherent information is sequentially read in and by repeating the above described processings in S109 and S110 and the print job will be generated. Here, the image inherent information 12-2 to undergo reference is images designated under user interface UI 17 among print setting data in FIG. 7, and non-

designated images shall be excluded in advance.

For further detailed description, in S109, the control data of that image are prepared based on the image inherent information in midst of reference, and in S110, the image data part of the print job is prepared from the image file stored in a position which the relative path of the image file expresses, and processing for image inherent information in midst of reference will be considered. At the time when the image control data are prepared in S109, if there are output destination and number of copies or the like clearly designated from the user at the time of printing execution indication, those pieces of information are reflected onto the image control data.

In S111, if there is no other image inherent information to be read in, the generated print job is stored (S112) and the printing execution indication processing ends.

FIG. 9 shows an example of system construction of the image recording device 102 in the image storage system of the first Embodiment of the present invention, and for example shows a case of laser beam printer. Incidentally, the image recording device 102 to which the present embodiment is applied will not be limited to laser beam printers, but it goes without saying that they may be printers of other printing systems such as ink jet printers, etc. In addition, in

the following descriptions as well as drawings, an example with which two option units have been brought into connection will be described, but further many option units can be connectable and the main body may commonly have function of the option units.

In FIG. 9, reference numeral 102 denotes a laser beam printer (printer), with which respective kinds of option apparatuses can be brought into connection, and is brought into connection with a data processor 101 with general-purpose interface (such as Centronics, RS232C or the like), and based on printing information (control information on code data, etc. based on a predetermined printer language including for example PostScript, LIPS (list processing program) III, LIPS IV and image data or the like) transferred from the data processor 101 via this general-purpose interface and printing information read out from the memory card 110 connected with the image recording device the stored images are processed.

Reference numeral 103 denotes a video controller, which is brought into connection with the data processor 101 with the above described general-purpose interface, receives code data (ESC (escape character) code and respective PDL (page description language) data, etc.) transferred from the data processor 101 via the above described general purpose interface so as to form page information consisting of dot data or the

like based on this code data, transmits image data (in binary or multivalued) to a later-described engine controller 105, and transmits commands on sheet feeding designation as well as sheet discharging designation or the like toward a later-described option controller part 106 via unified interface 90.

The engine controller 105 forms a latent image on the photosensitive drum (the later-described reference numeral 220 in FIG. 10) by way of a known electrophotography processing, based on the image data transferred from the above mentioned video controller 103, and transfers and fixes it onto a supplied stock paper to execute printing. Incidentally, at this time, timing on sheet feeding/discharging or the like is instructed to the option controller part 106.

Reference numeral 104, which denotes a panel part (operation panel) of the laser beam printer 102, is an interface with a user constructed by various switches (buttons) for user's operation, an LED (light emitting device) display device, an LCD (liquid crystal device) display device, etc., and the user operates the panel part 104 so as to instruct the printer 102 for the predetermined operation. Incidentally, various data or the like set by the user are stored and controlled, a non-volatile memory, for example, (not shown) NVRAM (non-volatile RAM), EEPROM (electrically

erasable/writable ROM), etc.

An option controller part 106, which comprises (not shown) CPU, ROM and RAM, etc., is a unified controller to unify and control one or more option apparatuses (units) based on sheet feeding/discharging instruction, etc. transferred from the above described video controller 103 as well as sheet feeding/discharging instruction, etc. from an engine controller 105, and communicates with an option controller unit 106 which various option apparatuses comprise via option unit interface 70 so as to control the various option apparatuses in a unified fashion.

In addition, inside the option controller part 106, there is a common memory (shown in the later-described FIG. 15) to which the video controller 103 is accessible, and this common memory is constructed by conveying status control area covering approximately 40 pages, basic status area, command status control area, start-up processing area or the like, and the video controller 103 makes instructions to respective options apparatuses via respective areas of the above described common memory.

Incidentally, the above described conveying status control area is constructed by a region where the video controller 103 notifies respective option apparatuses of printing method (sheet feeding port, paper discharge tray, color, stapling, and to shifting, etc.) and a

region to notify the video controller 103 of the respective option status (up to where printing is executed and sheet discharging is completed, etc.).

In addition, the basic status area is a region to
5 notify the video controller 103 of abnormality of
respective option apparatuses (door open, jam,
mechanical trouble, cassette stock paperlessness,
discrepancies in paper sizes, fully loaded, staple
neddlelessness or the like), the command and status
10 control area is a region to exchange command status
with the video controller 103, and the start-up
processing area is a region where the video controller
103 designates start-up processings for respective
option apparatuses.

15 Reference numeral 107 denotes a sheet feeding
option apparatus (unit), and is, for example, a paper
deck option unit, which has a paper deck controller
(large capacity sheet feeding cassette controller) 107a
inside it and controls sheet feeding based on the
20 control information transmitted from the option
controller part 106. Incidentally, the above described
paper deck controller 107a comprises a CPU, a ROM, and
a RAM (which are not shown) and the CPU is housed in
the ROM to control the sheet feeding option apparatus
25 107 based on the program. In addition, in the ROM,
extended information of the sheet feeding option
apparatus 107, e.g. information on the stock paper size

storable in the paper deck or the like, is stored.

Reference numeral 108 is a sheet discharging option apparatus (unit), e.g. a sorter option unit having sorting function, for example, which has a
5 sorter controller (large capacity sheet discharging stucker controller) 108a inside it to execute sorting operation as well as sheet discharging operation based on the control information transmitted from the option controller part 106. Incidentally, the above described
10 sorter controller 108a comprises a CPU, a ROM, and a RAM (which are not shown) and the CPU is housed in the ROM to control the sheet discharging option apparatus 108 based on the program. In addition, in that ROM, extended information of the sheet discharging option
15 apparatus 108, e.g. information on the number of paper discharge trays, availability of sorting function, availability of stapling function, availability of shifting function to move a sheet-discharged sheet to a predetermined direction, availability of reversing
20 function to reverse direction of the face of the discharged sheet or the like, is stored.

Incidentally, the sheet feeding option apparatus 107 and the sheet discharging option apparatus 108 are respectively provided with the operation parts 107b as
25 well as 108b comprising display parts and various keys so as to be capable of displaying message and operation methods to the user during use of respective options

and operating.

Reference numeral 110 denotes a memory card and the box of the printer 102 is provided with one or more of its mounting ports so that the card is attachable and detachable. The user mounts the memory card 110 or controls the panel part 104 so as to be capable of instructing a predetermined operation to the printer 102.

In addition, reference numeral 109 denotes a control unit, and is constructed by an engine controller 105 to execute print process control of the above described printer 102, a video controller 103 to control the entire printer 102, analyze data from a data processor 101 and convert them to image data, and an option controller part 106 to control respective option units in a unified fashion.

Incidentally, the option controller 106 controls the respective option units with a common option unit interface 70 and communicates with the video controller 103 via the unified interface 90. The present embodiment features that the video controller 103 controls the respective sheet feeding/discharging option units via the option controller part 106.

FIG. 10 depicts sectional structure of the printer 102 in FIG. 9, and the same reference numeral denotes the same parts as those in FIG. 9 so that repeated description will be omitted.

In FIG. 10, reference numeral 230 denotes a stock paper cassette, which holds recording sheets S and has a mechanism to detect sizes of the recording sheets S electrically with a (not shown) partition. Reference numeral 231 denotes a cassette sheet feeding clutch, which is a cam to separate only one recording sheet in the top of the recording sheets S disposed on the stock paper cassette 230 to make the separated recording sheet S to be conveyed to reach the sheet feeding roller 204 with (not shown) driving means, intermittently rotates on each sheet feeding and sheet-feeds one recording sheet corresponding with one rotation. Reference numeral 230S denotes a recording sheet detection sensor to detect quantity of the recording sheets S held in the stock paper cassette 230.

Reference numeral 227 denotes a resist shutter, which pushes stock papers and halts sheet feeding. The sheet feeding roller 204 conveys the tip part of the recording sheet S to reach the resist shutter 227. Reference numeral 202 denotes a tray for manual supply for the recording sheets S to be disposed. Reference numeral 203 denotes a sheet feeding clutch for manual sheet supply, which conveys the recording sheet S disposed in the tray for manual sheet supply 202 to reach the resist shutter 227. Reference numeral 233 is an option sheet feeding roller (sheet feeding relay

conveying roller) which supplies into the main body of the printer 102 the recording sheet S supplied from the sheet feeding option 107.

In addition, the downstreams of the above
5 described sheet feeding roller for manual supply 203, the cassette sheet feeding clutch 231 and the option sheet feeding roller 233 are provided with a pair of resist roller 205 to convey the recording sheets S in a synchronized fashion, and the downstream of the resist
10 roller is provided with an image recording part 207 to form a toner image onto the recording sheet S with laser beams emitted from a laser scanner part 206 by way of the known electrophotography process.

In the laser scanner part 206, reference numeral
15 215 denotes a laser unit, which emits laser beams based on image signals (VDO signals) transmitted from the video controller 103. The laser beams emitted from the laser units 215 is scanned by a polygon mirror 216 to form a latent image onto a photosensitive drum 220 via
20 image forming lens group 218 as well as reciprocating mirror 219. Reference numeral 217 denotes a beam detector, which detects laser beams emitted from the laser unit 215 to output main scanning synchronization signals. Reference numeral 270 denotes a light amount
25 sensor, which detects light amount of laser beams emitted from the laser unit 215.

In addition, in the image recording part 207,

reference numeral 222 denotes a primary charger to uniformly charge the surface of the photosensitive drum 220. Reference numeral 223 denotes a developing device, which is charged with the primary charger 222, toner develops a latent image formed in the photosensitive drum 220 subject to laser exposure with the laser scanner part 206. Reference numeral 224 denotes a transfer charger to transfer the toner image on the photosensitive drum developed with the above described developing device 223 onto the sheet-fed recording sheet S with the resist roller 205. Reference numeral 225 denotes a cleaner and removes the residual toner on the photosensitive drum 220. Reference numeral 221 denotes a pre-exposure lamp to deprive the photosensitive drum 220 of photoelectricity.

Reference numeral 208 denotes a fixing device to fix with heat the toner image formed in the recording sheet S with the image recording part 207 onto the recording sheet S. Reference numeral 210 denotes a conveying roller to sheet-discharge and convey the recording sheets S. Reference numeral 209 denotes a sheet discharging sensor to detect delivery state of the recording sheets S. Reference numeral 211 denotes a flapper to switch the conveying direction of the recording sheet S subject to completion of recording to the side of the sheet discharging sheet loading tray

213 or the side of the sheet-discharging option
apparatus 108. Reference numerals 214 and 212 denote
sheet discharging rollers to sheet-discharge the
recording sheets S conveyed with switching of the
5 flapper 211 to the loading tray 213. Reference numeral
213S denotes a sheet-discharged sheet load capacity
detecting sensor to detect load capacity of the
recording sheets loaded on the discharged-sheet loading
tray 213.

10 In addition, the engine controller 105 inside the
control unit 109 controls the electrophotography
process with the laser scanner part 206, the image
recording part 207 and the fixing device 208 and
control conveyance of recording sheets inside the main
15 body of the laser printer 102.

Moreover, the video controller 103 is brought into
connection with the data processor 101 with a general-
purpose interface (for example, Centronics and RS
(recommended standard) 232C or the like) to extend the
20 coming image information transmitted via the genera-
purpose interface into bit data and to transmit those
bit data to the engine controller 105 via the video
interface 80 as VDO signals.

In addition, the data read out part 413 is a
25 portion to mount detachably attachable storage medium
110 such as a compact flash, smart media and a memory
stick or the like, to read out printing data from the

data stored in those storage media at the time when the storage media are mounted, execute the processing as in the case when the coming data have been transmitted from the above described data processor 101 and to execute printing.

Next, respective option units brought into connection with the main body of the printer 102 in a detachably-attachable fashion will be described.

The option controller part 106 depicted in FIG. 9 is provided inside the main body depicted in FIG. 10 so that various option units are constructed to be communicable with the same protocol via an option unit interface 70 to become a common bus. In addition, the option controller part 106 is brought into connection with the video controller 103 via the unified interface 90.

In the sheet feeding option apparatus 107 such as a paper deck option unit or the like, reference numeral 241 denotes a paper deck where large amount of the recording sheets are piled up on the ascending/descending deck. Reference numeral 242 denotes a paper deck sheet feeding roller and sheet-feeds the recording sheets S loaded on the paper deck 241. Reference numeral 244 denotes a conveying roller and conveys the recording sheets S sheet-fed from the paper deck sheet-feeding roller 242 in the direction of the option sheet-feeding roller 233. Reference numeral

243 denotes a sheet feeding relay conveyance roller to relay-convey the recording sheets sheet fed from another sheet-feeding system option unit (an option unit capable of sheet-feeding the recording sheets with different sizes and same sizes) which is detachably/attachably connectable in plurality in the lower part of the paper deck option. In addition, reference numeral 241S denotes a recording sheets housing amount detection sensor to detect disposed amounts of the recording sheets S disposed onto the paper deck 241.

Incidentally, the paper deck option unit (sheet feeding option apparatus) 107 is controlled by the paper deck controller 107a.

In the sheet discharging option 108 of the sorter option unit or the like, reference numerals 251 to 257 denote a first sheet-discharging bin to a seventh sheet-discharging bin executing face down sheet discharge and to classify already recorded recording sheets S to be loaded. In addition, reference numeral 258 denotes an eighth sheet discharging bin to sheet-feed the conveyed-in sheets to the sorter option directly straight and to execute face up sheet discharge. Reference numeral 280 denotes a flapper to switch conveyance so as to switch faces of sheets on the recording sheets S transmitted to the sorter option unit (sheet-discharge option apparatus) 108 sorted by

the flapper 211 of the main boy of the printer 102
based on instructions from the video controller 103.
In addition, reference numerals 261S to 268S denote
sheet-discharge empty detection sensor to detect
5 existence or lack of the recording sheets to be sheet-
discharged to the first sheet-discharge bin 251 to the
eighth sheet-discharge bin 258.

Moreover, the sheet discharge load capacity
detection sensors 271S to 278S denote full-mount
10 detection sensors and the sorter controller 108a
notifies the video controller 103 via the option
controller 106 on the full mount at the point of time
when the height of the recording sheets loaded on the
above described first sheet-discharging bin 251 to
15 eighth sheet-discharging bin 258 reaches (detects) for
example 18 mm (equivalent to approximately 120 sheets).

In addition, the above described first sheet-
discharge bin 251 to eighth sheet-discharge bin 258 can
load approximately 120 sheets for each bin, that is
20 approximately 960 sheets in eight bins, and among them,
the first sheet-discharge bin 251 to seventh sheet-
discharge bin 257 can execute sorting sheet-discharge.

In the case where the video controller 103 has
designated face up via the unified interface 90,
25 sorting is executed with the face up flatter 280 being
switched on so that the sorted recording sheets S are
transmitted as they are to the paper discharge tray

with the roller 290. In addition, in the case where the video controller 103 has designated face down via the unified interface 90, sorting is executed with the face up flapper 280 being switched off so that the sorted recording sheets S are conveyed by the roller 291 until the tail end of the recording sheet S once exceeds the face up flapper 280, and next the roller 291 rotates in the reverse direction so that the tail end of the recording sheet S is transmitted into the vertical path, and the bin flappers 281 to 286 are driven at a predetermined timing by the designated sheet-discharge bin so that sorting is executed to respective face down paper discharge trays and sheet discharge is completed in the face down state. With the sheet-discharge bin being the seventh sheet-discharge bin 257, without driving the bin flapper, sheet discharge is executed as is so that face down sheet discharge is completed.

Moreover, in the case where the video controller 103 has designated (not shown) stapler to execute stapling via the unified interface 90, the recording sheets S are deposited in the (not shown) staple tray so that the recording sheets S are arranged and the stapler execute stapling to discharge sheets to any of the first sheet-discharge bin 251 to the eighth sheet-discharge bin 258. In addition, in the case the video controller 103 designates shifting via the unified

interface 9, the stock sheets are deposited in the (not shown) staple tray as in case of staple designation, and the recording sheets S are arranged with the recording sheets S being moved together with the tray, that is, the disposition area (tray) of the recording sheets S to undergo sheet discharge is moved and thereafter sheet-discharge is executed any of the first sheet-discharge bin 251 to the eighth sheet-discharge bin 258. In addition, a (not shown) staple needles remaining amount detection sensor is provided so as to detect the remaining amount of the staple needles stored inside the staple.

Incidentally, the sorter option unit 108 is controlled by the sorter controller 108a.

In addition, the option controller part 106, the paper deck controller 107a and the sorter controller 108a are respectively brought into connection with (not shown) connectors and serial communication is executed by the option unit interface 70. Each party is connected in series with the same connector, and accordingly, the paper deck option unit 107 and the sorter option unit 108 can be brought into connection with their connection order being changed.

Incidentally, the downstreams of the above described sheet feeding roller for manual supply (sheet feeding clutch for manual supply) 203, the cassette sheet feeding clutch 231 and the paper deck sheet

feeding roller 242 are provided with a pair of the
above described resist roller 205 to convey the
recording sheets S, the sheet feeding roller 204 and
the conveying roller 244 respectively, and the
5 downstream of the resist roller 205 is provided with the
above described image storage part 207 to form a toner
image onto the recording sheet S with laser beams
emitted from the above described laser scanner part
206. Moreover, the downstream of the image recording
10 part 207 is provided with the above described fixing
device 208 to fix with heat the toner image formed on
the recording sheet S, and the downstream of the fixing
device 208 is provided with the sheet-discharge sensor
209 to detect the conveyance state of the sheet-
15 discharging part, the conveying roller 210 to convey
the recording sheets and the flatter 211 to switch the
conveying direction of the recording sheet S which has
completed recording or the like.

FIG. 11 shows flows of signals in a circuit of the
20 printer 102 depicted in FIG. 9, and the same reference
numeral denotes the same item as in FIG. 9.

In FIG. 11, reference numeral 91 denotes a serial
communication interface, and commands such as sheet-
feeding designation to the paper deck option unit 107
25 and the sheet-discharge bin designation to the sorter
option unit 108 or the like are transmitted to the
option controller part 106 from the video controller

103 while status such as sheet existence or lacking in
the paper deck option unit 107, loading of each sheet-
discharge bin in the sorter option unit 108 and
existence or lack of staple needles are transmitted to
5 the option controller part 106, and the option
controller part 106 and the video controller 103 may be
directly connected with the CPU bus.

Reference numeral 92 denotes /OPTRDY signal, which
functions as signals to show an option designated by
10 the video controller 103, for example whether or not
the staple is in a ready state for use, to be
transmitted to the video controller 103 from the option
controller part 106. Reference numeral 93 denotes
/POUTT signal to function as timing signals for the
15 main body of the printer 102 to sheet-discharge the
recording sheets. Reference numeral 94 denotes /PFEDT
signals and functions as signals to show timing to
receive the recording sheets from option units.
Reference numeral 95 denotes /SPCNG signals, which
20 deaccelerates the recording sheets S conveyed in
rapidly inside the option units, and functions as
signals to adjust itself to the conveying velocity of
the main body of the printer 102.

Reference numeral 81 denotes a communication
25 interface, commands such as sheet feeding designation
to the sheet feeding cassette of the main body of the
printer 102, sheet discharging designation to the sheet

discharging tray 231 of the main body of the printer 102 and printing etc. is transmitted from the video controller 103 to the engine controller 105, and the status such as existence or lack of paper and jam, etc. in the paper stock cassette 230 of the main body of the printer 102 is transmitted from the engine controller 105 to the video controller 103. Reference numeral 82 denotes bit data transmitted from the video controller 103.

10 In addition, FIG. 11 does not depict but control on respective processings by this engine controller 105 is executed based on signals to be exchanged with the video controller 103, and as those signals, there are /CPRDY, /PPRDY, /RDY, /PRNT, /VSREQ, /VSYNC, /BD, /SCLK, /CMD, /CBSY, /STS, /SBSY and /CCRT (Condition Change Report T), details of which are as shown in FIG. 12.

Among the above described signals, in order to show methods for use on /CCRT signals, processing will consist of Procedure 1 and Procedure 2 described as follows.

(Procedure 1)

The video controller 103 normally checks /RDY signals and /CCRT signals, and will go to read out status information when those signals are changed. At that time, /CCRT signals are "FALSE" (false) and /RDY signals have become "FALSE", at first, status on

contents of misprint, wait, sleep, operator all or the like is checked. Corresponding with that check outcome, status at low-ranking status corresponding with respective bits is referred to so that details are confirmed.

(Procedure 2)

On the other hand, when /CCRT signals have become "TRUE" (true), at first, status of contents such as changes in stock sheet sizes, changes in existence or lack of stock sheets in sheet feeding part change function of sheet feeding part and changes in warning contents or the like are read out so that kinds of status having undergone changes is recognized and status of the group is sequentially read out in order to recognize details. In addition, as for resetting procedure of /CCRT signals, the engine controller 105 always checks status change in the very end, that is changes in paper sizes, changes in existence or lack of paper, changes in sheet feeding function, changes in warning states, and when there has occurred any change, the condition change status falling under the upper-ranking thereof is set at "1" as well as /CCRT signals being hard signals are made "TRUE". Thereafter, in receipt of status request command from the video controller 103, with the fact that the condition change status is read in to the video controller 103, /CCRT signals are made "FALSE".

In addition, the unified interface 90 is constructed with five lines of hard signals of serial communication interface (I/F) 91, /OPTRDY signals 92, /POUTT signals 93, /PFEDT signals 94 and /SPCNG signals 95.

Incidentally, three signals of /POUTT signals 93, /PFEDT signals 94 and /SPCNG signals 95 are outputted from the engine controller 105, and are inputted to the option controller part 106 via the video interface 80 through the video controller 103. Details of the above described respective signals are as described in FIG. 13.

FIG. 14 shows a detailed circuit construction of the video controller 103 shown in FIG. 9, and the same reference numeral denotes the same item as in FIG. 9.

In FIG. 14, reference numeral 401 denotes a panel interface (I/F) part, which receives respective settings as well as instructions from the operator from the panel part 104 by way of data communication with the panel part 104. Reference numeral 402 denotes a host interface (I/F) part, and is a part inputting-outputting signals to and from the data processor 101. Reference numeral 406 denotes an engine interface (I/F) part, and is a part inputting-outputting signals to and from the engine controller 105 so as to transmit data signals from the (not shown) output buffer register and execute communication control with the engine

controller 105.

Reference numeral 403 denotes an image data
generating part and generates bit map data for actual
printing based on control code data sent from the data
processor 101. Reference numeral 405 denotes an image
memory, that houses image data. Reference numeral 409
denotes a CPU, which is in charge of entire control of
the video controller 103. Reference numeral 404
denotes a ROM, which houses the control code of the CPU
409. Reference numeral 407 denotes a RAM, which
functions as temporal storage means to be used by the
CPU 409. Reference numeral 410 denotes EEPROM, which
is constructed by non-volatile memory media.

Reference numeral 408 denotes a DMA (dynamic
memory access) control part, which transfers the bit
map data inside the image memory to the engine
interface part 406 by instructions from the CPU 409.
Reference numeral 412 denotes an option interface (I/F)
part, which executes communication with the option
controller part 106 corresponding with instruction from
the CPU 409. In addition, /POUTT93, /PFEDT94 and
/SPCNG95 having been shown in FIG. 13 are transmitted
to the unified interface 90 from and through the engine
interface part 406.

Reference numeral 413 denotes a data read-out
part, which reads out printing data of the memory card
110 based on insertion of the memory card 110 or

instructions of the operator from the panel part 104. Here, based on the read-out data, execution of printing will be proceeded as in case of data reception from the data processor 101.

5 Reference numeral 411 denotes a system bus, which has an address bus as well as a data bus. The panel interface part 401, the host interface part 402, the image data generation part 403, the ROM 404, the image memory 405, the engine interface part 406, the RAM 407,
10 the DMA control part 408, the CPU 409, EEPROM 410 and the option interface part 412 are respectively brought into connection with a system bus 411 and are
 accessible to all functioning parts on the system bus 411.

15 Incidentally, the control code controlling the CPU 409 shall be constructed by an OS (operation system) to execute time-division control with load module unit called a task by the (not shown) system clock and a plurality of load modules (tasks) shown in FIG. 18 to
20 be described later that operates on a function-by-function basis.

 FIG. 15 is a schematic view being a memory map of the common memory 501 with the video controller 103 secured in (not shown) RAM provided inside the option
25 controller part 106 having been shown in FIG. 9 in the present embodiment.

 FIGS. 16A and 16B are schematic views showing

procedures of the video controller 103 and the option controller part 106 issuing the command status to acquire detailed information of input and output options respectively.

5 At first, with reference to FIG. 15 and FIGS. 16A and 16B, a control method that the video controller 103 unifies and controls respective option apparatuses via the option controller 106 will be described.

10 The common memory 501 shown in FIG. 15 consists of a conveying status control area 501-1 to know the conveying status of the sheets, a basic status portion 501-2 to know abnormal states of respective options, a command status portion 501-3 to exchange command status and a start-up processing portion 501-4 to designate
15 the start-up processing of the option apparatuses.

 The start-up processing portion 501-4 consists of a start-up designating portion to execute designation from the video controller 103 and the completion notifying portion to notify that as a result of
20 executing designation the respective options have completed processings. The video controller 103 executes designation to this start-up processing portion 501-4 so as to execute start-up processing for the respective option or the like.

25 When the power is turned on, the video controller 103 notifies the start-up designation portion of the start-up processing portion 501-4 of initializing

designation of the common memory 501, the configuration information acquisition designation of respective options necessary for the option controller 106, and completion of information acquisition so as to

5 supervise at the completion notifying portion whether or not the respective processing is completed, and when all are completed, the start-up processing will come to an end.

10 The conveying status control area 501-1 consists of a portion to designate printing methods such as the sheet feeding port, the paper discharge tray, color/monochrome, staple position and execution and a portion to be kept addressed of option status such as up to where the sheets have been fed, whether or not
15 the print signal may be outputted, or whether or not sheet discharge has been completed. The video controller 103 designates the above described print methods and will execute printing, keeping status of the respective options under control. For this above-
20 described designation in the start-up processing 501-4, designation covering maximum 40 pages is possible, and designation is executed sequentially every page, and the region where sheet discharge is completed is regarded as a vacant region and is initialized so that
25 redesignation is executable and is used as a ring buffer.

The basic status portion 501-2 is an area (region)

to notify abnormal status of respective apparatuses,
and acquires from this region the status such as
sheetless, jam, door open, mechanical trouble and
fully-loadedness or the like. From the contents of the
5 basic status, further detailed information is acquired
with the command status.

The command status portion 501-3 is a region to
acquire detailed information of respective options as
well as to control operation of options, and designates
10 the command corresponding with necessity to this region
to acquire information. For example, acquirable
information is a device name, a sheet-feeding
implementation sheet size, a sheet feeding paper
capacity, a position of jam, a kind thereof, an access
15 point, a load capacity of the sheet discharging paper,
and details on mechanical troubles etc., and these
issue commands corresponding respective circumstances
as shown in FIGS. 16A and 16B (Procedure 23) to receive
status. In addition, control on options such as
20 transition to power saving mode, emergency stop at the
time of jam, movement of the sheet discharging bin,
execution of resetting or the like is executed
involving the command status portion 501-3 as well.

Thus, the video controller 103 acquires the above
25 described information, executes printing under a state
without any abnormality, and in case of having detected
occurrence of abnormality from the basic status

(Procedures 21 and 22), issues a command status to specify the abnormal spot (Procedure 23), and moreover specifies the abnormal contents on that apparatus (Procedures 24 to 28 and 29) and will execute detailed information collection or the like (30) as well control corresponding with that abnormality.

The flow chart in FIG. 17 accesses to the common memory 501 in the option controller 106 in FIG. 15, exchanges command status with respective options, and shows mechanism to exchange information.

In FIG. 17, when the video controller 103 acquires option information, designation is executed to the command status control area 501-3 inside the memory that the option controller 106 has and the information is received. ID (distinguisher) to distinguish necessary kinds of information (S201), number of data to execute designation to the option controller 106 with execution commands (S202), data expressing the designated contents (S203) is designated to a predetermined address for the command designating region so that the fact the command has been transmitted is notified, and the option controller 106 triggers to communicate with respective option apparatuses and to acquire information (S204).

Based on trigger by S204 and the designated contents, the option controller 106 executes serial communication with necessary option apparatuses to

obtain the designated information. On the other hand,
until the option controller 106 gets the information
completely, the timer is started so that it is
supervised whether or not the video controller 103 is
5 conditioned to be capable of acquiring the status
information (S205, S206).

In the case where no transition to the status
information acquirable state takes place even in a
constant time, the status information can not be
10 acquired, and therefore a try notification is executed
to execute commands again (S611) and the processing
comes to an end.

In S206, when transition to the status information
acquirable state has taken place, the status ID is
15 acquired so that it is confirmed whether or not it is
the status information for the designated command
(S207). Next, the status data number is acquired
(S208), the status data covering the status data number
are acquired (S209) and completion of status
20 acquisition is notified to the option controller 106
(S610).

FIG. 18 is a flow chart showing data flow, in the
present embodiment from the data processor 101 or the
memory card 110 to the option controller part 106 as
25 well as the engine controller part.

The control code controlling the CPU 409 shall be
constructed by an OS to execute time-division control

with load module unit called a task by the (not shown) system clock and a plurality of load modules (tasks) that operates on a function-by-function basis.

Translator processing system (analysis extension task) in FIG. 18, scheduling system (page operation task), engine I/F part 406 and the option I/F part 412 are tasks that are embodied by the CPU 409 as described above, and shall be operated in parallel logically. Prior to detailed description on the data flow in FIG. 18, various tables in Fig 19 to FIG. 21 related to this flow will be described.

FIG. 19 shows a structure of page table 31 that stores the page information in FIG. 18. The page table 31 is a table to recognize each page logically in the CPU 409 in FIG. 14, is embodied to exist as continuous regions to the above described RAM 407 (not shown) control information storage region, and is controlled by the (not shown) page control function part for acquisition and release.

"Raster pointer" in the page table 31 in FIG. 19 is a leader pointer of the region covering one gape in the above described image memory 405, and the CPU 409 divides the (not shown) region in question in the image memory 405 on a page-by-page basis to link it to here at the time of initializing subject to the power being switched on.

"Status flag" in the page table 31 is a region to

store the flag showing the status of the page, and as shown in reference numeral 32 in FIG. 19 includes:

"extension completion flag"

"page designation completion flag"

5 "print start flag"

"sheet discharge completion flag"

"release flag"

or the like, and this status flag can judge in what status the prepared page information is.

10 "Sheet feeding mode" in the page table 31 is to instruct determination method of the sheet feeding means and includes:

"automatic sheet feeding"

"cassette 1 (cassette 230) sheet feeding"

15 "paper deck (cassette 107) sheet feeding"

"MP tray sheet feeding"

(all of which are not shown) or the like. Here,

"automatic sheet feeding" is a mode to search from the sheet-feeding means where the sheet size is

20 corresponding and the sheets are disposed in accordance with a predetermined priority for determination.

As for "requested sheet size" in the page table 31, numerical expression on the sheet size requesting sheet feeding to the engine controller 105 is stored.

25 In addition, "sheet discharge mode" in the page table 31 is to instruct the determination method of the sheet discharging means, and "user separate automatic

mode" and "user separate fixing mode" are designated to this "sheet discharging mode". In the case where "user separate automatic mode" or "user separate fixing mode" have been designated, the name designated as the sheet discharge destination is stored in "designated distinguishing name", and the actual paper discharge tray determined by the paper discharge tray searching processing to be described later in FIG. 22 and FIG. 23 is stored in "paper discharge tray" in the page table 31.

FIG. 20 shows the structure of the job control table 33 in the RAM 407 of FIG. 14. The job control table 33 is status as well as contents of the input job taken under control in the video controller 103, and is embodied to exist as continuous regions to the above described RAM 407 (not shown) control information storage region, and is controlled by the (not shown) job control function part for acquisition and release.

Any of the above described tables are referred to or renewed from the analysis extension task, the page operation task, the engine I/F task and the option I/F task.

FIG. 21 shows a structure of the engine status table 34 in the RAM 407 in FIG. 14. The engine status table 34 is the status of the engine controller 105 taken under control of the video controller 103, and is not the same as the status of the actual engine

controller 105, but reflects the status of the engine controller 105 and is renewed by a predetermined communication at any timing.

For example, "/RDY status" is a flag reflecting the status of the /RDY signals, and the engine I/F task (reference should be made to FIG. 18) comes up with "TRUE" while it is detecting "FALSE" of the /RDY signals.

In addition, "/CCRT state" is a flag reflecting the state of the /CCRT signal and the engine I/F task reflects the state of the actual /CCRT signals. The engine I/F task detects "TRUE" of the /CCRT signals, and by acquiring the state of the engine controller 105 with a predetermined serial communication so that the /CCRT signal will become "FALSE" as described above.

"Sheet feeding stage number" reflects mount of the option cassette unit or the like and is selectable sheet feeding stage number.

"Existence of sheets in the cassette 1" is existence or lack of sheets in a cassette 230. "Cassette 1 sheet size" is a sheet size set with a (not shown) dial of the cassette 230, and with a precondition that the operator has mounted the same sheets as in the dial value, is recognized as the sheet size of the cassette 230.

"Existence of paper deck sheets" is existence or lack of sheets in the cassette (paper deck option unit)

107. "Paper deck sheet size" is a sheet size set by a
(not shown) partition plate of the sheet feeding option
cassette 107, and with a precondition that the operator
has mounted the same sheets as in the value of the
5 partition plate, is recognized as the sheet size of the
sheet feeding option cassette 107.

The data flow in FIG. 18 will be described as
follows. As an input method of the printing data there
are a case from the data processor 101 and a case from
10 the memory card 110, and in case of printing from the
data processor 101, the inputted print data (control
codes and PDL or the like) are stored on a
predetermined block-by-block bases in the host
interface part 402, and in case of printing from the
15 memory card 110, the data readout part 413 reads out
the Image forming instruction file 12 and the image
data, etc. inside the memory card so that the same
printing data (control codes and PDL or the like) as
the printing data formed in the data processor 101 are
20 generated in the job generation unit inside the ROM 404
and will be stored on a predetermined block-by-block
bases.

The analysis extension task detects data in the
host I/F part 402 or the job generation unit to acquire
25 the page table 31. In addition, the data are analyzed
on a the above described block-by-block bases, and the
image forming information (a figure drawing order of

the PDL and a character code or the like) undergoes
image extension with the image data generating part 403
in FIG. 14 (which are not shown in FIG. 18) or the CPU
409 itself and is stored in the region indicated by
5 "raster pointer" in the page table 31. In addition,
the control information (number of copies and selection
on feeding sheet or the like) for the printer is stored
in the page table 31. After analysis and extension on
the data covering one page is completed, the "extension
10 completed" is made TRUE and the page cue 35 of the FIFO
structure is enqueued.

The page operation task simultaneously supervises
"status flag" of the all pages in the above described
page cue 35, and changes conveying procedures
15 corresponding with status to realize printing. At this
time, printing designation on sheet feeding means,
sheet discharging means and printing mode or the like
are executed with the option I/F part 412, and setting
such as sheet feeding means, etc. is actually executed
20 toward the engine controller 105 with the engine I/F
part 406. The page table the "sheet discharge
completion flag" having become TRUE is dequeued from
the page cue and is returned to the above described
page control function part.

25 The engine I/F task as well as the option I/F task
respectively communicates with the engine controller
105 as well as the option controller 106 via the engine

I/F part 406 and the option I/F part 412 at a predetermined cycle and renews the above described "status flag" when a factor to change the page status. In addition, it supervises changes in /RDY signals and, for the change of TRUE to FALSE, indicates that an error is taking place and supervises cancellation of the error. In addition, it supervises status changes such as /RDY signals as well as /CCRT signals, etc., and executes the above described "Procedure 1" and "Procedure 2" having been described with FIG. 12 and renews the above described "engine status table".

The operation mode designation (number of copies and selection on feeding sheet or the like) from the panel part 104 is temporally stored in the panel I/F part 401. The (not shown) printer control task executes rounds of supervision on the panel I/F part 401 in an appropriate interval and stores data that might exist into the EEPROM 410, and at the same time stores them in the (not shown) control information storage region of the RAM 407 as the control information. Storage into the EEPROM 410 will enable the printer to operate with a mode desired by a user even after the power of the print is once switched OFF.

A flow chart in FIG. 22 shows processing up to reception of the printing data and completion of printing. A flow chart in FIG. 23 shows paper discharge tray searching processing at the time of user

separate fixing mode. A flow chart in FIG. 24 shows notifying processing to the data processor at the time when the job comes to an end. A flow chart in FIG. 25 shows an information renewing processing of respective paper discharge trays. With reference to these FIGS. 22 to 25, processing procedures which the printer in the present embodiment will be described.

At first the printing data transmitted from the data processor 101 are analyzed in S301 in FIG. 22 so that the control information as well as the drawing information is extended and stored into the memory in S302.

In the next S303, it is judged whether or not the sheet discharge mode is automatic designation from the control information, and in the case that it is not automatic designation, the fixedly designated paper discharge tray is selected based on the control information (S312) to judge existence or lack of abnormality (S314), and if no abnormality exists, printing is executed (S315).

In case of automatic designation, what in a plurality of automatic modes has been designated is judged in S304, S306, S308 and S310 so that any searching processings among user separate automation (S305), user separate fixing mode (S307), sorting (S309), stack (S311) and unjust designation processing (S313) is executed according to the determined

designation. Also in this case, as at the time of fixed designation, existence or lack of abnormality is judged (S314), and if no abnormality exists, printing is executed (S315).

5 After printing is executed in S315, subject to sheet discharge of the printed sheet in S316, sheet discharge comes to an end or the finalization of the job is notified to the data processor 101.

10 On the other hand, in S314, in the case where abnormality such as full stack or the like has been detected, an error display corresponding with the contents of the abnormality is executed (S317), and subject to cancellation of the abnormality by an operation of the user (S318), the error display is
15 cancelled (S319), the processing from S303 is reexecuted so that the step goes forward to a recovery processings.

20 Subject to repetition of the above described processing, entire sheet discharge of the printing job comes to an end, and then the finalization notifying event of the printing job is transmitted to respective data processors 101, and the user is notified of to which paper discharge tray the sheet has been outputted on a user interface of the respective data processors
25 (S316).

Next, in FIG. 23, the user separate fixing mode processing of S307 in FIG. 22 will be described in

detail. Incidentally, S305, S309, S311, S312 and S313
in FIG. 22 and the searching processing of S404 in FIG.
23 do not directly relate to the present invention, and
therefore the detailed description thereof will be
omitted in the present embodiment.

When searching processing of the user separate
fixing mode starts, at first in S401, paper discharge
tray name designated in the printing data is taken out
so that it is judged whether or not there exists the
same paper discharge tray name by comparison with the
sheet discharging port name registered in each paper
discharge tray (S402). In S402, if there exists the
same paper discharge tray name, the paper discharge
tray registered under that name is determined as the
paper discharge tray of the designated printing data
(S403).

In S402, if there does not exist the same paper
discharge tray name, a processing such as the paper
discharge tray for escape is determined as the paper
discharge tray for the designated printing data as the
searching processing at the time of unjust designation
will be executed (S404).

After the searching processing of the paper
discharge tray name taken out in S401 has come to an
end, it is judged whether or not there exists other
paper discharge tray names designated in the printing
data (S405), and if not, the searching processing of

the mail box sheet discharge comes to an end, and if there is any, processings of S401 to S405 are repeated.

Next, with reference to FIG. 24, processing to execute information renewal of the sheet discharge bin will be described. The status renewal of the sheet discharge bins 251 to 257 is executed by acquiring status information that changes status in a constant cycle interval.

At first, in S501, it is judged whether or not the load capacity in the sheet discharging bin has changed, and if there is any change, the loading status is renewed (S502). In addition, subject to waiting for a constant time (S503), the processing from S501 is repeated.

Next, with reference to FIG. 25, processing to display information indicating status of the paper discharge tray of the printer will be described. In the case where the status of the printer has changed, the event is received in S601 and the contents of that event are analyzed (S602). Corresponding with those contents, as a result of that analysis, a predetermined display or cancellation on display is executed so that the status change on the printer is notified to the user (S603).

Executing the above described processing, in the case where, for example, the user would like to confirm the loading state in the paper discharge tray, the

loading state information of each paper discharge tray is displayed in the panel of the printer, etc.

That is, as shown in FIG. 26, information such as the paper discharge tray name registered in each paper discharge tray or the loading rate or the like is
5 displayed so as to be recognizable at one sight and the information such as the use status of each paper discharge tray or the like is notified to the user.

In addition, as shown in FIG. 27, for a specific
10 paper discharge tray or a specific image of that paper discharge tray, information such as the paper discharge tray name, the image number, the photographed date and the title, etc. may be displayed, and these pieces of information may be displayed in the panel of the
15 printing apparatus, the digital camera, the display of the computer or the like, and other display apparatuses. Moreover, if the memory card is accessible, respective images themselves may be displayed.

FIG. 28 shows an example of index printing of
20 images respectively sheet-discharged to respective paper discharge trays in the case where printing processing has been executed under the user separate fixing mode in one embodiment of the present invention.
25 The index print 36 sheet-discharged into respective paper discharge trays 251 to 257 having loading is the one that the output image having undergone sheet

discharge to that sheet discharging port has arranged
to be ready for a glance, and may be the one to
automatically output on a job-by-job bases according to
setting of the user or the system, or may be the one to
5 output only the index print in the case where the user
has clearly instructed. The output instruction of the
index print may be executed by operations of buttons
from the digital camera 1 or may be executed by
operations of the panel of the image recording device
10 102. In addition, it may be instructed from outside
equipment such as a host computer, etc.

FIG. 28 shows an example of the index print of an
image having been sheet-discharged to "Bin1" with a
paper discharge tray name of "kakky". The output image
15 sheet-discharged to this paper discharge tray 251 is an
image undergoing sheet discharging destination
designation under distinguishing name of "kakky". In
addition, the user information being the owner of the
memory card 110 in which the source data for these
20 images have been stored is displayed as a print result
of "user information=Shimomaruko Taroh (TEL: 03-3757-
????), the date and time when these images have been
outputted as a print result of "printed date and
time=2000/05/ 15:51" and the number of images sheet-
25 discharged to this paper discharge tray 251 as a print
result of "print number=41 sheets". Moreover, the
respective images sheet-discharged to this paper

discharge tray 251 have been print-outputted as a list together with the image serial number and output copy number in form of a downsized image. It goes without saying that information other than that described above
5 may be print-outputted as the contents to be print-outputted to the index print.

As described above, with output of the index print 36, the user can easily know output images classified to respective paper discharge trays under which
10 distinguishing names have undergone sheet discharge of how many sheets of copies respectively and how many sheets in total. In addition, for example, the printing image is distributed to a user at the distribution destination together with the index print
15 36 so that the user at the side where receipt has taken place can know at a glance that he/she has received what images and how many of them.

FIG. 29 exemplifies print output of information of loading job of all paper discharge trays. In FIG. 29,
20 output images display loading job information on all the paper discharge trays 251 to 257 in form of a list, and other than common information such as "sheet discharging mode", "total number of sheet discharge", "output date and time" or the like the information such
25 as paper discharge tray name registered in a paper discharge tray and "number of sheets of sheet discharge" sheet-discharged to the paper discharge tray

or the like is printed for each paper discharge tray.
This entire paper discharge tray loading job
information print 37 may be the one to automatically
output on a job-by-job bases according to setting of
5 the system, or may be the one to output only entire
stack job information when the user has clearly
instructed. When the output of the entire paper
discharge tray loading job information print 37 is
instructed, the operation may be operation of a button
10 from the digital camera 1 or may be operation of the
panel of the image recording device 102 or the like.
In addition, outside apparatus such as a host computer
or the like may make instructions. The output
destination may be a paper discharge tray for escaping,
15 a set predetermined paper discharge tray or may be a
paper discharge tray to instruct the user at the time
of outputting.

As described above, the entire paper discharge
tray job information is made to be available for
20 outputting, the user can easily know which
distinguishing names have been registered for
respective sheet discharging ports 251 to 257 of the
image recording device for the sheet-discharged job.

FIG. 30 exemplifies print outputs of information
25 of a loading job of a specific paper discharge tray.
In FIG. 30, an output image displays loading job
information of a specific paper discharge tray in form

of a list, and other than information on the paper discharge tray such as "paper discharge tray", "paper discharge tray name", "sheet discharging mode", "number of load copies" of the paper discharge tray, "output date and time" or the like, image attached information such as "image serial number", "photographed date", "title" and "number of copies" is printed for loaded individual image. This paper discharge tray loading job information print 38 may be the one to automatically output on a job-by-job bases according to setting of the user or the system, or may be the one to output only specific job information in the case where the user has clearly instructed. The output instruction of paper discharge tray loading job information print 38 may be executed by operations of buttons from the digital camera 1 or may be executed by operations of the panel of the image recording device 102. In addition, it may be instructed from outside equipment such as a host computer, etc. Whether or not to which paper discharge tray output should be made may be up to selection of the user. The output destination may be the one to sheet-discharge respectively to paper discharge trays being the objects of the print contents, or may be the paper discharge tray the user instructs.

As described above, the paper discharge tray loading job information is outputted so that the user

can easily know detailed information concerning the output image of that paper discharge tray at need.

(Second Embodiment)

In the above described first Embodiment of the present invention, the memory card 110 was arranged to execute printing by being mounted onto the image recording device 102, but the digital camera 1 and the image recording device 102 may be brought into communication connection with RS-232C, Centronics, Ethernet, SCSI, USB and interface cable stipulated by IEEE 1394 or by an interface realizing various data transfer method such as IRDA and Blue Tooth, etc. so that printing is executed by printing indication from the display part of the panel part 104 or the digital camera 1 of the image recording device 102. Here, the memory media of the digital camera 1 may be a compact flash, a smart media and a detachably attachable flash memory such as a memory stick or the like, or be the one fixedly built-in in the digital camera.

The second Embodiment in the present invention will be described for only portions that are different from those in the first Embodiment of the present invention with reference to FIG. 31 to FIG. 36.

FIG. 31 shows a concept on an example of an operation system to print and output images read out with the digital camera 1 by way of "user separate fixing mode". In particular, FIG. 31 depicts an

example where the digital camera 1 has in advance designated the output destination on an image-by-image bases under distinguishing name, the output images are classified for distinguishing names according to contents of the storage media in which those designated pieces of information are stored.

The storage media 7 inside the digital camera 1 stores attached information related to respective images other than image data of shot images. For these pieces of information, as information to be automatically stored, there are image number, photographed date, and formatting format of an image file, etc., and as information to be inputted by a user after shooting, there are title, trimming information, rotation information, and number of print sheet etc. Otherwise, names of people who need distribution as distribution users so that a same image is delivered to a plurality of person as in the case of printing as well as names of their offices may be inputted there.

Moreover, into the storage medium 7, not only the above described image attached information but also information on printing indication may be stored. For printing indication information, there are graphic mode, color mode, sheet discharging mode, number of sheet printing, etc. to become information of outputting printer and control information at the time of printing and respective detailed setting

information, etc. shall be included.

According to an example in FIG. 31, the printing processing that is instructed for execution from the digital camera 1 will be described.

5 In FIG. 31, "user separate fixing" as sheet discharging mode, any distinguishing name for each image as output destination, and any necessary copy number value for each image as number of copies is stored in the storage medium 7 inside the digital
10 camera 1 with input operations from a user. In receipt of printing indication from a user, the image recording device 102 receives image related information of the storage medium 7 inside the digital camera 1 via a predetermined communication medium 8, and reads in the
15 image related information that the job generation unit has received to start preparation of the job based on the "user separate fixing" mode designated as sheet discharging mode.

 In the case where the print job by way of "user
20 separate fixing" mode is generated, the distinguishing name designated as output destination will become judgment clue to execute classification processing for each image. For the example in FIG. 31, "baseball club", "hardball tennis club", "softball tennis club",
25 "swimming club male", and "swimming club female", etc. being "output destination" for each image is used as distinguishing name for classification processing.

Here, images may be set for operations without any "output destination" being designated.

5 In the processing for generating print jobs, with "user separate fixing" mode being designated, the distinguishing name having been designated as "output destination" for each image is treated as the sheet discharging destination and the value designated as "number of copies" is added to the printing indication information for each image.

10 When preparation of a print job is completed, the job generation unit delivers that print job to the data analysis portion. The image recording device 102 analyzes contents of the print job based on the generated print job to execute predetermined print
15 processing according to those contents. In the case of the print job as in the example of FIG. 31, as the page information on the number covering the value designated as the number of copies is copied, sheet discharge destination for each image will be determined so that
20 the outputs are classified into the paper discharge trays 251 to 257 registered under the same name as the distinguishing name designated as the sheet discharge destination.

Here, respective paper discharge trays 251 to 257
25 of the image recording device 102 shall be registered by distinguishing names in advance, and that registration may be inputted by way of panel operation

the user from the panel part 104 of the image recording device 102 or registration of paper discharge tray name may be made so that the digital camera 1 accesses to the image recording device 102 via a predetermined communication media 8.

As for images for which feeding-discharging destinations have been determined, predetermined print processing is executed sequentially, and as in the example of FIG. 31, sheets for designated number of copies of each image covering the output results of images with sheet discharging destination being designated under distinguishing name of "baseball club" are sheet-discharged into the paper discharge tray "Bin1" with reference numeral 251, sheets for designated number of copies of each image covering the output results of images with sheet discharging destination being designated under distinguishing name of "hardball tennis club" are sheet-discharged into the paper discharge tray "Bin2" with reference numeral 252, sheets for designated number of copies of each image covering the output results of images with sheet discharging destination being designated under distinguishing name of "softball tennis club" are sheet-discharged into the paper discharge tray "Bin3" with reference numeral 253, sheets for designated number of copies of each image covering the output results of images with sheet discharging destination

being designated under distinguishing name of "swimming club male" are sheet-discharged into the paper discharge tray "Bin4" with reference numeral 254, and sheets for designated number of copies of each image covering the output results of images with sheet discharging destination being designated under distinguishing name of "swimming club female" are sheet-discharged into the paper discharge tray "Bin5" with reference numeral 255.

Thus, the print processing is executed under "user separate fixing" mode so that without taking the position of the sheet discharging destination into consideration, the user can designate the sheet discharging destination under names and can designate necessary copies for each image. In addition, those designations are made to be stored into the storage medium 7 inside the digital camera 1 as the image related information in advance so that only necessary number of necessary images can be outputted with print instruction at a time.

So far, a concept on an operation system to print and output images read out with the digital camera 1 by way of user separate fixing mode has been described.

Next, for print setting processing as well as printing execution indication processing in the present embodiment, an example of user interface as well as the processing procedures will be described.

The print setting processing as well as printing execution indication processing may be executed from the display part of the panel part 104 of the image recording device 102 as in the first Embodiment of the present invention, or may be executed while communicating with the image recording device 102 from the display part 2 of the digital camera 1. However, here the case where the processing starts from the display part 2 of the digital camera 1 will be described.

At first, with reference to FIGS. 32A and 32B, print setting processing in the digital camera 1 will be described. FIGS. 32A and 32B are examples of user interface screen to describe procedure for a user to execute print setting with the digital camera 1.

FIG. 32A is an example of an user interface screen of the display part 2 displayed in the case where "print setting" is selected from the operation menu of the digital camera 1 in order to execute print settings. In the above described drawing, the print setting contents include items such as "sheet discharging mode" to set how to classify the output images, "media" to set media such as ordinary paper, paper for special purpose, thick paper and OHP, etc., "graphic mode" to set drawing method or drawing quality of the output image, "print system" to set which print system to take in the case there are a plurality of

print systems (LBP (laser beam print) system and ink
jet system, etc.) in the image recording device of the
output destination, and "number of copies" or the like
to set number of copies to be duplicated for the entire
5 job for printing. The user matches the cursor
indicated by "*" onto the item to be set among
respective items with operation buttons or the like so
as to execute selection with "determining" operation.
For example, in the case where setting of sheet
10 discharging mode is executed, in this screen the cursor
"*" is matched to "sheet discharging mode" so as to
realize by executing "determining" operation.

FIG. 32B is an example of user interface screen to
be displayed when "sheet discharging mode" is selected
15 in FIG. 32A in order to set the sheet discharging mode.
In the above described drawing, setting contents for
the sheet discharging mode include items such as "user
separate automatic", "user separate fixed", "sort" and
"stack", etc. for each possible sheet discharging mode
20 in the image recording device 102 which is brought into
communication connection. The user matches the cursor
indicated by "*" onto the item to be set among
respective items as the sheet discharging mode with
operation buttons or the like so as to execute
25 selection with "determining" operation. In the case
where the sheet discharging mode is set to the user
separate automatic mode, in this screen the cursor "*"

is matched to "user separate fixing" so as to realize by executing "determining" operation.

Next, with reference to FIGS. 33A and 33B and FIG. 34, printing execution indication processing in the digital camera 1 as well as the image recording device 102 will be described. FIGS. 33A and 33B show examples of user interface screen to describe procedure for a user to execute printing execution indication from the digital camera 1 while the flow chart in FIG. 34 shows the printing execution indication procedure in the data processing part as well as the image recording device 102 of the digital camera 1.

At first, in FIGS. 33A and 33B, FIG. 33A is an example of a user interface screen of the display part 2 having displayed the operation menu of the digital camera 1. In the above described drawing, the menu items include "photographing mode" to photograph images, "reproducing mode" to display the photographed image in the LCD (liquid crystal display: display part) 2 of the digital camera 1, "editing mode" to edit the photographed images, "print setting" to set on printing having described in FIG. 32, and "print execution" to execute printing execution indication of the photographed image based on the contents of this "print setting" or the like. The user matches the cursor indicated by "*" onto the item to be set among respective items with operation buttons or the like so

as to execute selection with "determining" operation.
For example, in the case where instruction of print
execution is executed, in this screen the cursor "*" is
matched to "print execution" so as to realize by
5 executing "determining" operation.

FIG. 33B is an example of user interface screen of
the display part 2 to be displayed when "print
execution" is selected in FIG. 33A in order to execute
the printing execution indication. In the above
10 described drawing, when processing for printing
execution indication is executed, it is indicated
together with ongoing status of print processing that
printing processing is going on such as for example,
"printing is being executed ...50%", and in addition,
15 selection items such as "printing is suspended" in
order to suspend printing, "job contents to be
displayed" in order to display contents of the printing
job with access to the image recording device 102,
"delivery status of printer to be displayed" in order
20 to display delivery status of the image recording
device 102, and "return to menu screen" in order to
return to the menu screen in FIG. 33A or the like are
displayed.

With the printing execution indication from the
25 digital camera 1, when the image related data are
transmitted from the digital camera 1 to the image
recording device 102, the image recording device 102

may be a system that automatically judges that data in receipt is image related data, and may be a system that the image recording device 102 has been set so as to receive the image related data for the digital camera 1 to execute thereafter data transmission by the printing execution indication.

The flow chart in FIG. 34 relates to FIGS. 33A and 33B and shows the processing procedure in the case where the printing execution indication from the digital camera 1 by the user is executed. The flow chart in FIG. 34 includes the processing of the digital camera 1 and the processing of the image recording device 102 and for the data communication between S702 and S704, actually transmission and reception shall be executed in a non-synchronized fashion.

In FIG. 34, when the user instructs printing execution, the digital camera 1 proceeds with negotiation with the image recording device 102 and checks whether or not they are ready for communication (S701). In S701, if it is judged that communication with the image recording device 102 is impossible, the warning message such as "Communication with the printer is impossible. Please check the communication cable." or the like is displayed so as to notify the user of the fact that communication connection with the image recording device 102 is missing (S703) so that the printing execution indication processing comes to an

end. In S701, if communication with the image
recording device 104 is possible, the image related
information stored in the storage medium 7 inside the
digital camera 1 is transmitted to the image recording
5 device 102 (S702).

On the other hand, the image recording device 102
receives the image related information transmitted from
the digital camera 1 to store in a predetermined
storage part (S704). In S704, when reception of data
10 is completed, in S705 the Image forming instruction
file 12 is detected from the image related information
stored in that storage part and the contents thereof
are read in, and the image data, the image attached
data and the print setting data or the like are
15 referred to. In addition, ability information (number
of paper discharge trays, number of sheet feeding
ports, feeding paper size, and types, etc.) of the
image recording device 102 is also acquired (S706) and
with comparison between those pieces of the acquired
20 ability information and the contents referred to in
S705 it is judged whether or not printing as designated
can be executed (S707).

In S707, if print execution is impossible, the
warning message such as "Cannot proceed with user
25 separate fixing sheet discharge." is displayed so as to
display reflecting the contents and notify the user
that printing as designated is not executable (S703)

with the printing execution indication processing
coming to an end. Display of the warning message is
executed to the display part 2 of the digital camera 1
but may be executed to the display part of the image
5 recording device 102.

In S707, if printing is executable, the processing
goes forward to S708 and onwards. In S708, taking the
print setting data into consideration, based on the
image common information 12-1 described in the Image
10 forming instruction file 12 read-in in S705, header
data for the print image are added so that the print
job is generated. Moreover, respective image inherent
information 12-2 described in the Image forming
instruction file 12 will be read in and after, at
15 first, in S709 the leading image inherent information
is read in, based on the image inherent information in
midst of reference, the processing in S711 to prepare
the control data of that image based on the image
inherent information in midst of reference as well as
20 the processing of S712 to prepare the image data part
of the print job from the image file stored in a
position indicated by the relative path of the image
file and to finalize the processing to the image
inherent information in midst of reference, and in S713
25 if there is another image inherent information 12-2,
the next image inherent information 12-2 will be read
in sequentially (S710) so that the print job will be

generated by repeating the processing in S711 and S712.

Here, the images to be referred to are images that the print setting data have instructed printing or images the output destination of which is designated in the image inherent information 12-2, and images lacking those designations shall be excluded in advance. At the time of preparation of the image control data in S711, if there are any output destination and number of copies, etc. clearly designated by the user at the time of printing execution indication, those pieces of information are reflected to the image control data. If there is not any other image inherent information to be read-in in S713, the generated print job is saved (S714) and the printing execution indication processing comes to an end.

FIG. 35 depicts a status that the digital camera 1 displays the delivery status (loading information) of respective paper discharge trays 251 to 257 of the image recording device 102 of the connection destination. In the above described drawing, the digital camera 1 displays, in its display part 2, information on delivery status of respective paper discharge trays 215 to 257 from the image recording device 102 being the connecting destination. The display contents thereof are information, for example, the paper discharge tray name registered in a paper discharge tray and load capacity, etc. on each of the

paper discharge trays 251 to 257, and displays in a list the delivery status for all the paper discharge trays. With this display, the user can know easily to which discharging port the respective output images are sheet-discharged.

FIG. 35 was to display all the paper discharge trays, but as will be described next, the digital camera 1 can further display detailed information on the output images page discharged to the respective paper discharge trays 251 to 257.

FIG. 36 depicts that the digital camera 1 displays detailed information of the images loaded on a specific paper discharge tray of the image recording device 102 of the connection destination. In the above described drawing, the digital camera 1 displays detailed information of the images outputted to a specific paper discharge tray of the image recording device 102 of the connection destination, for example, "Bin1". This display can be executed by the user to operate "*" cursor displayed in the head of the "paper discharge tray" of FIG. 35 and to select the paper discharge tray that he/she is going to refer to. The display contents are the paper discharge tray name of "Bin1", the image outputted to that paper discharge tray, that image number, the photographed date of that image, and the title of that image, etc. The user can refer to the outputted images to that paper discharge tray 251

sequentially by operation of buttons or the like.

(Variation of First Embodiment)

The first Embodiment of the present invention was to mount a memory card 110 onto the image recording device 102 and execute printing, but as shown in FIG. 37, may be to mount storage medium 110 such as a memory card, etc. onto a data processor 41 such as a personal computer, etc., to indicate printing from the display part of that data processor 41 so that the image recording device 102 receives a print job generated in the data processor 41 via an interface cable 42 to execute print processing.

(Variation 1 of Second Embodiment)

The second Embodiment of the present invention was a system to transfer image related data from the digital camera 1 to the image recording device 102 so that the image recording device 102 analyzes that image related data to generate the print job, but in the case where the image recording device 102 became communicable with the storage medium 7 inside the digital camera 1, may be a system to automatically acquire the image related data inside that storage medium 7 to generate the print job based on that image related data.

(Variation 2 of Second Embodiment)

The second Embodiment of the present invention was a system to transfer the image related data from the

digital camera 1 to the image recording device 102 so
that the image recording device 102 analyzes that image
related data to generate the print job, but may be a
system to read out the image related data from the
5 storage medium 101 such as a memory card, etc. inside
the digital camera 1, to provide with means to generate
the print job, to generate the print job inside the
digital camera 1, to transfer that print job to the
image recording device 102, and to execute printing.

10 Moreover, a menu that can select these processes
may be provided to the digital camera 1 or to the image
recording device 102 so that the user can select an
optimal processing even when there is difference in the
performance of the digital camera 1 and the performance
15 of the image recording device 102 or the like, and this
selection may be arranged so that the performance is
compared between the digital camera 1 and the image
recording device 102 and automatic judgment is executed
so as to achieve high picture quality (resolution and
20 gradation, etc.) and rapid printing (SPU specification,
etc.) for printing.

(Third Embodiment)

Next a third embodiment of the present invention
will be described. Incidentally, description on the
25 common parts in FIG. 3 to FIG. 25 will be omitted.

FIG. 40 shows an operation system for a user to
execute a printing reservation on image data stored in

hosts (host computers) 51 and 52 which are connected
with a remote printer 102 via the Internet 55, to
execute clear printing execution indication by panel
operation of a panel part 104 to the printer 102 when
5 he/she visits a printer installation spot so that the
printer 102 executes print output by user separate
fixing mode according to that indication.

FIG. 41 shows operation timing of an operation
system for a user to execute a printing reservation on
10 image data stored in the hose 51 in hosts 51 and 52
which are connected with a remote printer 102 via the
Internet 55, to execute clear printing execution
indication by panel operation of a panel part 104 to
the printer 102 when he/she visits a printer
15 installation spot so that the printer 102 executes
print output by user separate fixing mode according to
that indication.

At first, in FIG. 40, a host 51 with IP (Internet
Protocol) address of "111.2.33.44" and a host 52 with
20 IP address of "111.2.33.55" are constructed in the same
LAN (Local Area Network) 54, and a server 57 with IP
address of "222.33.4.111" and a printer 102 with IP
address without clear description are constructed in
the print service LAN 56. Moreover, the respective LAN
25 54 and 56 are brought into connection via the Internet
55.

Under such system, procedures for a user to

execute a printing reservation on image data stored in the host 51 which are connected with a remote printer 102 via the Internet 55, to execute clear printing execution indication by panel operation of a panel part 5 104 to the printer 102 when he/she visits a printer installation spot so that the printer 102 executes print output by user separate fixing mode according to that indication will be described with reference to FIG. 40 and FIG. 41.

10 In FIG. 41, the user executes an access to a print service server "222.33.4.111" with reference numeral 57 via a Web (WWW) browser 58 on the host 51 (S901) and downloads a file in HTML (Hypertext Markup Language) format for executing print reservation request to the 15 printer 102 controlled by the print service (S902). The HTML file transferred from the print service server 57 is displayed, for example, as in FIG. 43 to be described later on the Web browser 58 of the host 51.

The user will describe information necessary to 20 output the image file 53 stored in the host 51 to the remote printer 102 on the Web browser 58 according to contents of the HTML file downloaded from the print service server 57. Those description contents include image information for printing, a storage place of the 25 Image forming instruction file where user information, etc. are stored (directory), an outputting printer 102 and a trustee service-company name, a method of

receiving output images or the like. In the case where the Image forming instruction file 12 does not exist in the host 51, it is required to be prepared according to a predetermined format, and can be prepared by
5 description onto the screen on the Web browser 58 displayed as in FIG. 44 to be described later.

When a user notifies the print service server 57 of respective places of the Image formation instruction file via the Web browser 58 of the host 51 to execute
10 print reservation requests based on the contents of that Image forming instruction file (S903), the print server 57 accesses to the outputting printer 102 designated by the host 51 to execute print reservation requests by notifying places of the Image formation
15 instruction files 12 notified by the host 51 and that host information (IP address, etc.) (S904).

Printer 102 receives print reservation requests from the printer service server 57 to access to respective places of the Image forming instruction file
20 12 of the remote host 51 via the Internet 55 according to received host information and information on the storage place of the Image forming instruction file (S905). The Image forming instruction file 12 that is stored in a predetermined format inside that directory
25 is searched and the found Image forming instruction file 12 is downloaded (S906). When a predetermined Image forming instruction file has not been found at

the time of searching, an error message may be displayed on the Web browser 58 of the host via the print service server 57 in order to notify the user of that unjust event.

5 The printer 102 completes downloading of a predetermined Image forming instruction file 12, and then analyzes image information as well as user information, etc. described in the Image forming instruction file 12 (907). After analysis, all the
10 necessary image files 15 having been described in the Image forming instruction file 12 are downloaded from that storage place (S908 and S909), and the downloaded Image forming instruction file 12 as well as the image
15 file 15 are arranged to be stored in a predetermined recording device allocated to each user. In the case where image files are stored, staying conscious on the directory classification designated to the Image
forming instruction file 12, storage takes place in such a construction that relative path of each image
20 file from the Image forming instruction file 12 will become the same as the destination of downloading. However, in the case where the same construction is impossible, the host 51 is notified of that, or changed
path subject to storage in a form that can be
25 constructed may be reflected to the Image forming instruction file 12.

 In the case where the user has designated for

print reservation, the printer 102 will wait until the user visits the installation spot of the printer 102 and executes printing execution indication clearly by panel operation of the panel part 104 of the printer 102. In the case where the user executes printing indication to the printer 102, he/she inputs user ID from the panel part 104 of the printer 102 (S910). The user ID to be inputted may be an ID and a password that the user himself has designated or an electric mail address and a password, or may be a reservation number given by the print service server 57 at the time of print reservation.

When the user ID is inputted, the printer 102 displays the contents of the Image forming instruction file 12 that the host 51 having been designated by that user has downloaded, and if necessary, receives setting such as printing setting or the like from the user and waits for printing indication. In receipt of the printing execution indication from the user, the printer 102 prepares a printing job based on the contents of the Image forming instruction file 12 and the image file 15 (S911).

At the time of preparation of the printing job, with the sheet discharging mode of the printer being set at "user separate fixing" among print setting from the user, the "user separate fixing" mode is added to the sheet discharging designation of the printing job.

When the printing job generation is completed, the printer starts print processing, and executes classification processing under "user separate fixing" mode as shown in FIG. 40 to output (S912).

5 When the printing processing is completed, the printer displays a printing completion message to the panel 104 or transmits a sign expressing the printing completion in order to notify the user that printing is completed (S913) and the notification is made to the
10 print service server 57 as well (S914). At that time, information of number of printing or the like that will become information for settling the print service charge will be notified additionally.

 In the operation system such as the present
15 embodiment having been described so far, the user executing printing indication can monopolize to use the printer 102, which can use all of a plurality of sheet discharging bins 251 to 257 corresponding with purposes of the user. The print setting corresponding with
20 respective purposes of classification and classification processing of the printer 102 based on that designation will be described with reference to examples.

 FIG. 42 shows an operation system for print
25 outputting under user separate fixing mode, and is an example to proceed with classification of output images for each distinguishing name according to contents of

the Image forming instruction file 12 in which the outputting destination has been designated in advance by distinguishing name for each image file.

In FIG. 42, in the Image forming instruction file 12, "user separate fixing" is stored by input operation from the user as sheet discharging mode, any distinguishing name for each image as the outputting destination, and any necessary value of number of copies for each image as number of copies. In receipt of print indication from the user, the job generation part reads out the contents of the Image forming instruction file 12 and starts preparation of the job based on the "user separate fixing" mode designated as the sheet discharging mode. In the case where the print job by way of "user separate fixing" mode is generated, the distinguishing name designated as output destination will become a judgment clue to execute sorting processing for each image. For the example in FIG. 42, "baseball club", "hardball tennis club", "softball tennis club", "swimming club male", and "swimming club female", etc. being "output destination" for each image is used as distinguishing name for classification processing. Here, images may be set for operations without any "output destination" being designated. In the processing for generating print jobs, with "user separate fixing" mode being designated, the distinguishing name having been

designated as "output destination" for each image is treated as the sheet discharging destination and the value designated as "number of copies" is added to the print instruction information for each image.

5 When preparation of a print job is completed, the job generation unit delivers that print job to the data analysis portion. The image storage apparatus 102 analyzes contents of the print job based on the generated print job to execute predetermined print
10 processing according to those contents. In the case of the print job as in the example of FIG. 42, as the page information on the number covering the value designated as the number of copies is copied, sheet discharge destination for each image will be determined so that
15 the outputs are sorted into the paper discharge trays 251 to 257 registered under the same name as the distinguishing name designated as the sheet discharge destination.

 Here, respective paper discharge trays 251 to 257
20 of the image recording device 102 shall be registered by distinguishing names in advance, and that registration may be inputted by way of panel operation of the panel part 104 of the image recording device 102, may be set from the server 57 or hosts 51 and 52,
25 etc. to control the image recording device 102, or may be made to be designated in the Image forming instruction file 12 as one of print indication

information so that after downloading from the remote hosts 51 and 52 the image recording device 102 reads the registered contents in from the Image forming instruction file 12 for setting.

5 As for images for which feeding-discharging destinations have been determined, predetermined print processing is executed sequentially, and as in the example of FIG. 42, sheets for designated number of copies of each image covering the output results of
10 images with sheet discharging destination being designated under distinguishing name of "baseball club" are sheet-discharged into the paper discharge tray "Bin1" with reference numeral 251, sheets for designated number of copies of each image covering the
15 output results of images with sheet discharging destination being designated under distinguishing name of "hardball tennis club" are sheet-discharged into the paper discharge tray "Bin2" with reference numeral 252, sheets for designated number of copies of each image
20 covering the output results of images with sheet discharging destination being designated under distinguishing name of "softball tennis club" are sheet-discharged into the paper discharge tray "Bin3" with reference numeral 253, sheets for designated
25 number of copies of each image covering the output results of images with sheet discharging destination being designated under distinguishing name of "swimming

club male" are sheet-discharged into the paper
discharge tray "Bin4" with reference numeral 254, and
sheets for designated number of copies of each image
covering the output results of images with sheet
5 discharging destination being designated under
distinguishing name of "swimming club female" are
sheet-discharged into the paper discharge tray "Bin5"
with reference numeral 255.

Thus, also in the case where the image recording
10 device 102 is temporally monopolized for use by an
individual, the print processing is executed under
"user separate fixing" mode so that without taking the
position of the sheet discharging destination into
consideration the sheet discharging destination can be
15 designated under names and necessary copies for each
image can be designated. In addition, those
designations are made to be designated into the Image
forming instruction file 12 so that only necessary
number of necessary images can be outputted with print
20 instruction at a time.

FIG. 43 depicts a user interface example 61 of the
Web browser 58 for the user to request printing to the
printer 102 brought into connection from the host 51
via the Internet 55, and FIG. 44 depicts a user
25 interface example 62 of the Web browser 58 for editing
the Image forming instruction file 12 necessary for
executing printing request via the Internet 55.

At first, FIG. 43 will be described. In FIG. 43, the user selects at first a company name to which print service is requested as an output destination of the image file, or the name of the convenience store or the like is selected in the combo box of the "trustee service company". As for designation of the storage place of the Image forming instruction file, the host information is directly described to a text field of the "host information (IP address)" to directly describe the directory information to the text field of "directory information", or may be made to be designated while reference is being made to the directory by pushing the button of "editing of Image forming instruction file". If the host 51 which the user is requesting printing is automatically detectable on the host information (IP address), the initial value of "host information (IP address)" may be displayed automatically. In addition, if the Image forming instruction file is not prepared, the screen in FIG. 44 to be described later which is opened by pushing the button of "editing of Image forming instruction file" may be used for preparation.

As for designation on a method for reception, in case of receiving output image at the service window, or in case of indicating printing from a printer at the service window after a print reservation, the check box of "delivery by hand at the service window" is checked

while in case of arranging a door-to-door delivery system (a door-to-door delivery) to deliver the output image to the client's residence, the check box of "door-to-door delivery" is checked. In case of
5 receiving output images at the service window, a desired service window is selected for designation from the combo box of the "designated service window".

In the case where print reservation is requested subject to finishing all inputting, the button of
10 "printing to be reserved" is pushed. This serves to notify the print reservation request to the printer, and the printer 102 executes only downloading processing. At the time when the button of "printing to be reserved" is pushed, if there are unjust events
15 such as the case that description to each item is incomplete or the case that the designated image indication file does not exist etc., a warning message may be arranged to be displayed.

Next, FIG. 44 will be described. In FIG. 44, the
20 user designates at first the storage place of the Image forming instruction file. Designation of the storage place is directly described into the text field of "storage place of Image forming instruction file (directory)", or the "reference" button may be pushed
25 to proceed with designation while referring to the directory. The image file for outputting is displayed in the list of "designation of image file", and with

the "reference" button, each image file of each directory can be designated.

In addition, each image file can be edited by selecting the image file to be edited and pushing the button of "editing of image file" while image attached information (photographed date, image serial number, title, trimming information and rotation information etc.) on each image file) can be edited by selecting the image file to be edited and pushing the button of "editing of image attached information".

As for designation of user information, the user fills out respective text fields of "name", "electric mail address", "address" and "telephone number".

Incidentally, editing work on the Image forming instruction file 12 to be executed on a screen depicted by FIG. 43 may not be executed at the time of request of printing, but may be executed in the case where the title and image attached information such as image editing information etc. for each image file are stored. In addition, in the screen in FIG. 44, when the storage place of the Image forming instruction file 12 is designated, already stored displayable information may be displayed so as to notify the user that the information is already stored. If the format of the image indication file is the same, editing work may be executed with a predetermined application software and not on the Web browser.

Data contents to be described in the Image forming instruction file 12 are the same as in the above described FIG. 4, and therefore description thereon will be omitted.

5 Here, if the Image forming instruction file 12 is in a predetermined format, it can be prepared from an image read-out apparatus such as a digital camera etc., and except the above described Web browser, equipment supporting the same format or an application software
10 can prepare or can edit. In addition, the image file 15 will not be limited in terms of classes whether it be a file of picture image or a text file.

 FIG. 45 depicts an example of user interface of the Web browser 58 for a user to register a paper
15 discharge tray name (distinguishing name) at the time of operation under user separate fixing mode. In order to operate the image recording device 102 under the user separate fixing mode, it is necessary to register the distinguishing names for respective paper discharge
20 trays 251 to 257 of the image recording device 102 in advance. When the distinguishing names are registered for respective paper discharge trays 251 to 257, the user interface 63, shown in FIG. 45 for example, displayed in the display part of the image recording
25 device 102 can be used for registration.

 In FIG. 45, the fixed paper discharge trays 251 to 257 set at the EEPROM 410 of the printer 102 in advance

such as "Bin1", "Bin2" or "Bin3" are registered under names that the user can recognize easily such as "baseball club", "hardball tennis club" and "softball tennis club" respectively. As names to be registered

5 for the paper discharge tray under user separate fixing mode, user name, group name, or otherwise in the case where the image recording device is temporally monopolized for use by an individual, any name may be guessed freely corresponding with respective purposes.

10 The flow chart showing a processing procedure to register the paper discharge tray name (distinguishing name) at the time of operation under user separate fixing mode is the same as in the above described FIG. 6, and therefore description thereon will be omitted.

15 FIG. 46 depicts a user interface example of 64 of the Web browser 58 for indicating printing by panel operation of the panel 104 of the printer 102 based on the Image forming instruction file 12 as well as the image file 15 downloaded from the host 51.

20 As shown in FIG. 46, the display part of the image recording device 102 provides with "image designation" and "media" being selectable, and as for "output destination" and "number of copies", designation on whether reference should be made to data contents or

25 designation should be made clearly without reference to data contents can be designated with check boxes. Moreover, in the case where "output destination" and

"number of copies" are clearly designated without reference to data contents, desired output destinations as well as desired numbers of copies can be designated respectively. For "image designation", for example, whether all images inside the memory card 110 are printed or a portion thereof is printed, or a page of an index print showing a list of selected images is printed, is selected. In "media", it is selectable onto what the image should be printed.

In some cases, the image recording device 102 could be a machine exclusive for photos, but in the present embodiment, the apparatus shall be printable for a plurality of media, and ordinary paper, postcard, photo, coated paper, OHP sheet or the like can be selected, and in the input example of media in FIG. 46, "photo" has been selected. In the case where "output destination" is clearly designated, all paper discharge tray names (distinguishing names) having been registered in respective paper discharge tray in advance are displayed as selection items, and among them a sheet discharging destination tray of an image selected at "image designation" can be selected under distinguishing name corresponding with desired classification purposes. In the input example of the output designation in FIG. 46, "baseball club" is selected. In case of clearly designating "number of copies", desired number of output copies for images

selected at "image designation" can be selected. In the input example on number of copies in FIG. 46, "as for number of copies, reference should be made to contents of data" is designated, and therefore number of copies for images selected under "image designation" is not designated clearly.

After executing these selections, the user pushes "OK" button, the printer 27 reads out the contents of the Image forming instruction file 12 so that printing starts with the above described settings.

The flow chart in FIG. 47 shows a processing procedure in the case where execution of printing is instructed from the user by the panel operation of the panel part 104 of the printer 102.

In FIG. 47, when print execution is instructed from the user, the data readout part 413 reads out the contents of the predetermined Image forming instruction file 12 so as to refer to the image data, the image attached data and the print setting data or the like (S1001). Thereafter capability information (number of paper discharge trays, number of sheet feeding ports, feeding paper size and type or the like) of the image storage apparatus 102 is acquired (S1002), and in S1003, it is judged whether or not printing as described can be executed.

In S1003, if printing is not executable, warning message such as "user separate sheet discharge cannot

be executed," or the like is displayed, display
corresponding with the contents is executed, the user
is notified that printing as designated is not
executable (S1006), and the printing execution
5 indication processing ends. In S1003, if printing is
executable, the step goes forward to processing of next
S1004 and onwards.

In S1004, header data for a print image is added
based on image common information described in the
10 read-in Image forming instruction file in S1001 so that
the print job is generated. Moreover, each image
inherent information described in the Image forming
instruction file, or at first, the leading image
inherent information of S1005 will be read in, and the
15 other image inherent information is sequentially read
in so that the job will be generated, and the step goes
forward to the processing of S1008.

In S1008, the control data of that image are
prepared based on the image inherent information in
20 midst of reference. At the time when the image control
data are prepared, if there are output destination and
number of copies or the like clearly designated from
the user at the time of printing execution indication,
those pieces of information are reflected onto the
25 image control data. And in the next S1009, the image
data part of the print job is prepared from the image
file stored in a position which the relative path of

the image file expresses, and processing for image
inherent information in midst of reference will be
finished. Next in S1010, it is judged whether or not
there exist other image inherent information, and if
5 any, with the next image inherent information as a
reference destination (S1007), processing of S1008 to
S1010 is repeated. Here, the image data to be used for
job generation are selected based on image designation
having been set in advance in FIG. 46 and all the image
10 data or a part of image data reflecting the designated
contents will be selected.

In S1010, if other image inherent information
disappears, the step goes forward to the processing of
S1011, and in S1011, the print job prepared in the
15 above described processing is stored in the
predetermined storage region so that printing execution
indication is finished.

The above described FIG. 9 to FIG. 25 are applied
to a third Embodiment of the present invention
20 likewise, but in order to refrain from repeated
description, and therefore description thereon will be
omitted.

That is, system constructions of the image
recording device in the image system of the third
25 Embodiment of the present invention are as those in the
above described FIG. 9, and therefore description
thereon will be omitted. Likewise, the sectional

structure of the printer 102 in FIG. 9 is the same as that in the above described FIG. 10, and therefore description thereon will be omitted. In addition, various option units having been brought into
5 connection with the main body of the printer 102 in a detachably-attachable fashion are also as those in the above described FIG. 10, and therefore description thereon will be omitted. Circuit construction of the printer 102 and signals in FIG. 9 are as those in the
10 above described FIG. 11, FIG. 12 and FIG. 13, and therefore description thereon will be omitted.

In addition, the circuit construction of the video controller 103 in FIG. 11 is as that in the above described FIG. 14, and therefore description thereon
15 will be omitted. Means to acquire detailed information on respective input-output options by issuing command status based on the (not shown) common memory with the video controller 103 secured in the (not shown) RAM provided inside the option controller 106 in FIG. 11 as
20 well as the (not shown) original status are as those respectively in the above described FIG. 15 and FIGS. 16A and 16B, and therefore description thereon will be omitted. Procedure to access to that common memory, exchange command status with respective options
25 and exchange information is as that in the above described FIG. 17, and therefore description thereon will be omitted.

In addition, the data flow from the data processor 101 and the memory card 110 to the option controller part 106 and the engine controller part 105 in the present embodiment is as that in the above described FIG. 18, and therefore description thereon will be omitted. The structure of the page table 31 to store page information in FIG. 18 is as that in the above described FIG. 19, and therefore description thereon will be omitted.

In addition, the structure of the job control table 33 and the engine status table 34 inside the RAM 407 in FIG. 14 is as that respectively in the above described FIG. 20 and FIG. 21, and therefore description thereon will be omitted. In addition, the processing procedure from reception of the print data to printing completion is as that in the above described FIG. 22, the paper discharge tray searching processing procedure at the time of user separate fixing mode is as that in the above described FIG. 23, the notifying processing procedure for data processing at the time of job finishing is as that in the above described FIG. 24 and the contents of information renewing processing for each paper discharge tray is as those in the above described FIG. 25, and therefore description hereon will be omitted.

FIG. 48 depicts an example of display that the panel part 104 of the image recording device 102 renews

display of the sheet discharging status (load status)
of respective paper discharge trays 251 to 257. In
this sheet discharging status, "paper discharge tray",
"paper discharge tray name" and "load capacity" are
5 displayed in each bin of Bin1 to Bin7.

FIG. 49 depicts a display example that the panel
part 104 of the image storage apparatus 102 renews
display of detailed information of the images loaded on
a specific paper discharge tray 251. In this display
10 example, "paper discharge tray", "paper discharge tray
name", "image serial number", "photographed date", and
"title" and "image" as the printing object are
displayed for a specific paper discharge tray.

Moreover, the drawing showing the index print 36
15 for the images having been sheet-discharged to
respective paper discharge trays 251 to 257
respectively in the case where printing is executed
under user separate fixing mode is as that in the above
described FIG. 28. In the present embodiment, FIG. 28
20 shows an example of the index print of an image having
been sheet-discharged to "Bin1" with a paper discharge
tray name of "baseball club". The output image sheet-
discharged to this paper discharge tray 251 is an image
undergoing sheet discharging destination designation
25 under distinguishing name of "baseball club". In
addition, the user information being the owner of the
memory card 110 in which the source data for these

images have been stored is displayed as a print result of "user information=Shimomaruko Taroh (TEL: 03-3757-XXXX), the date and time when these images have been outputted as a print result of "printed date and
5 time=2000/05/05 15:51" and the number of images sheet-discharged to this paper discharge tray as a print result of "print number=40 sheets". Moreover, the respective images sheet-discharged to this sheet discharging port have been print-outputted as a list
10 together with the image serial number and output copy number. It goes without saying that information other than that described above may be print-outputted as the contents to be print-outputted to the index print 36.

As described above, with output of the index print
15 36, the user can easily know output images classified to respective paper discharge trays under which distinguishing names have undergone sheet discharge of how many sheets of copies respectively and how many sheets in total. In addition, for example, in case of
20 distribution to a user at the distribution destination, delivery is made together with the index print 36 so that the user at the side where receipt has taken place can easily know that he/she has received what images and how many of them.

25 FIG. 50 exemplifies print output of information of loading job of all paper discharge trays. In FIG. 50, output images of all the paper discharge tray loading

job information prints 65 display loading job
information on all the paper discharge trays in form of
a list, and other than common information such as
"sheet discharging mode", "total number of sheet
5 discharge", "output date and time" or the like the
information such as paper discharge tray name
registered in a paper discharge tray and "number of
sheets of sheet discharge" sheet-discharged to the
paper discharge tray or the like is printed for each
10 paper discharge tray. This entire paper discharge tray
loading job information print 65 may be the one to
automatically output on a job-by-job bases according to
setting of the user or the system, or may be the one to
output only entire loading job information when the
15 user has clearly indicated.

The output of the entire paper discharge tray
loading job information print 65 may be instructed by
panel operation of the image recording device 102 or
the like or may be outputted automatically for each
20 print job by setting at a server or a host or the like
to control the image storage apparatus 102. In
addition, as for that output instruction, outside
apparatus such as a host computer or the like may make
instructions at the time when printing is requested.

25 The output destination may be a paper discharge tray
for escaping, a set predetermined paper discharge tray
or may be a paper discharge tray to instruct the user

at the time of outputting.

As described above, the entire paper discharge tray job information is made to be available for outputting, the user can easily know which
5 distinguishing names have been registered for respective paper discharge trays of the image recording device for the sheet-discharged job.

FIG. 51 exemplifies print outputs of information of a loading job of a specific paper discharge tray.
10 In FIG. 51, an output image of a specific paper discharge tray loading job information print 66 displays loading job information of a specific paper discharge tray in form of a list, and other than information on the paper discharge tray such as "paper
15 discharge tray", "paper discharge tray name", "sheet discharging mode", "number of load copies, "output date and time" or the like, image attached information such as "image serial number", "photographed date", "title" and "number of copies" is printed for loaded individual
20 image. This paper discharge tray loading job information may be the one to automatically output on a job-by-job bases according to setting of the user or the system, or may be the one to output only specific job information in the case where the user has clearly
25 instructed. The output of the paper discharge tray loading job information may be instructed by panel operation of the image recording device or the like or

may be outputted automatically for each print job by setting at a server or a host or the like to control the image recording device. In addition, it may be instructed from outside equipment such as a host computer, etc. Whether or not to which paper discharge tray output should be made may be up to selection of the user. The output destination may be the one to sheet-discharge respectively to paper discharge trays being the objects of the print contents, or may be the paper discharge tray the user instructs.

As described above, the paper discharge tray loading job information is outputted so that the user can easily know detailed information when it become necessary on the output image of that paper discharge tray.

As described above, the third Embodiment of the present invention executes classification under user separate fixing mode so that sheet discharging destination can be designated by names and required number of copies of required print objects can be outputted. In addition, with whatever that is brought into connection with the printer inclusive of the printer, the host computer, or other outside apparatus, the loading status of the paper discharge tray of the printer can be easily confirmed, and therefore what kind of designated printed product is loaded to that paper discharge tray can be judged easily. Moreover,

since the loading status of each paper discharge tray,
detailed information on each image, and detailed
information for each print job or the like can be
printed and outputted, preparation of detailed
5 statements on charges in print service operation and
index print etc. can be executed automatically, and
enhancement in service work efficiency can be realized.
Moreover, the data will have been downloaded in
advance, actual printing will take place when the user
10 has executed printing indication, at that time he/she
inputs the user ID as well as the password etc. and
therefore operation with high security can be realized.
Moreover, as for the download data, a storage period on
the data is set and in the case where no printing
15 indication is executed during that period, those data
are erased automatically so that a vacant memory can be
secured and thus such a state that reception of
reservation is impossible due to insufficient memory
will become preventable.

20 (Fourth Embodiment)

The above described third Embodiment of the
present invention was an operation system that in the
case where print request is executed from the host 51
by the user the printer 102 executes only download
25 processing of the Image forming instruction file 12 and
the image file 15 toward the host 51, and in the case
where clear printing execution indication of the user

is executed by the panel operation etc., the print processing starts, but as in the fourth embodiment of the present invention to be described as follows, such an operation system may be provided that, in the case
5 where print request is executed from the host 51 by the user, the printer 102 executes downloading of the Image forming instruction file 12 and the image file 15 toward the host 51, and at the same time when this downloading is completed, the printing processing
10 starts.

In the fourth Embodiment of the present invention, only portions that are different from those in the third Embodiment (FIG. 52 and FIG. 53) will be described.

15 FIG. 52 shows an operation system for a user to execute a printing indication on image data stored in a host 51 which is connected with a remote printer 102 via the Internet 55 so that the printer 102 executes print output by user separate fixing mode according to that indication. FIG. 53 shows a processing procedure
20 of the operation system.

At first, in FIG. 52, a host 51 with IP (Internet Protocol) address of "111.2.33.44" and a host 52 with IP address of "111.2.33.55" are constructed in the same
25 LAN 54, and a server 57 with IP address of "222.33.4.111" and a printer 102 with IP address without clear description are constructed in the print

service LAN 56. Moreover, the respective LAN 54 and 56 are brought into connection via the Internet 55.

Under such system, procedures for a user to execute a printing indication on image data stored in the host 51 which are connected with a remote printer 102 via the Internet 55 so that the printer 102 executes print output by user separate fixing mode according to that indication will be described with reference to FIG. 34.

In FIG. 34, the user executes an access to a print service server "222.33.4.111" with reference numeral 57 via a Web browser 58 on the host 51 (S1101) and downloads a file in HTML format for executing print request to the printer 102 controlled by the print service (S1102).

The HTML file transferred from the print service server 57 is displayed, for example, as in the screen (an example of user interface) 61 in the above described FIG. 43 in the third Embodiment on the Web browser 58 of the host 51.

The user will describe information necessary to output image file stored in the host 51 to the remote printer 102 on the Web browser 58 according to contents of the HTML file downloaded from the print service server 57. Those description contents include image information for printing, a storage place of the Image forming instruction file where user information, etc.

are stored (directory), an outputting printer 102 and a trustee service-company name, a method of receiving output images or the like.

In the case where the Image forming instruction
5 file 12 does not exist in the host 51, it is required
to be prepared according to a predetermined format, and
in the third Embodiment, can be prepared by description
onto the screen (an example of user interface) 62 on
the Web browser displayed as in the above described
10 FIG. 44.

When a user notifies the print service server 57
of respective places of the Image formation instruction
file 12 via the Web browser 58 of the host 51 to
execute print requests based on the contents of that
15 image forming instruction file 12 (S1103), the print
server 57 accesses to the outputting printer 102
designated by the host 51 to execute print requests by
notifying places of the Image forming instruction files
12 notified by the host 51 and that host information
20 (IP address etc.) (S1104).

Printer 102 receives print requests from the
printer service server 57 to access to respective
places of the image forming instruction file 12 of the
remote host 51 via the Internet 55 according to
25 received host information, information on the storage
place of the image forming instruction file 12 (S1105).
The Image forming instruction file 12 that is stored in

a predetermined format inside that directory is searched and the found image forming instruction file 12 is downloaded (S1106). When a predetermined Image forming instruction file 12 has not been found at the
5 time of searching, an error message may be displayed on the Web browser 58 of the host 51 via the print service server 57 in order to notify the user of that unjust event.

The printer 102 completes downloading of a
10 predetermined Image forming instruction file 12, and then analyzes image information as well as user information, etc. described in this Image forming instruction file 12 (S1107). After analysis thereon, all the necessary image files having been described in
15 the Image forming instruction file 12 are downloaded from that storage place (S1108, S1109), and the print job is prepared from the contents of the analysis of Image forming instruction file 12 as well as the downloaded the image files (S1110).

20 At the time of preparation of the printing job, with the sheet discharging mode of the printer being set at "user separate fixing" in advance, the "user separate fixing" mode is added to the sheet discharging designation of the printing job. In addition, at that
25 time, designation of outputting destination for each image will become necessary, but automatic designation via such an application software that automatically

allocates the outputting destination by the setting of
the printer 102 may be taken as well. For example,
being mediated by such an application software that
reads out address being one of the user information of
5 the Image forming instruction file 12 so as to classify
it to respective regions with a predetermined
classification method such as "classification on a
prefecture basis inclusive of -to, -doh, -fu, and -
ken", or "classification on a city bases inclusive of -
10 ku, -shi, and -gun", "address" of the user information
of the image forming instruction file 12 is
automatically converted into "region name" so that the
outputting destination of the image file 15 is designed
by the region name of the user. That is, thus,
15 designation on "user separate fixing" is not executed
at the side of the user as in the above described third
Embodiment, but is executed by automatic setting at the
side of print service.

Thus, when the printing job generation is
20 completed, the printer 102 starts print processing, and
executes classification processing under "user separate
fixing" mode as shown in FIG. 52 to output (S1111).

When the print processing indicated by the user is
completed, the printer 102 notifies the print service
25 server 57 of the fact that printing has come to an end
(S1112). At that time, information of number of
printing or the like that will become information for

settling the print service charge will be notified additionally. When the print service server 57 receives a notice that printing has finished from the printer 102, the user will be provided with a notice on completion of printing, guidance on settlement of charge, and a method how to receive the output images with electric mail from electric mail address information at the time when printing has been requested at an appropriate point of time according to a predetermined setting of the print service operation corresponding with necessity (S1113). This notice of completion of printing and guidance may be provided via display on the Web browser 58 of the host 51.

Incidentally, in the conception view of FIG. 52, the printer 102 designates name of regions as distinguishing names based on address information of the user at the time of job generation to control so as to sheet-discharge to sheet-discharge bin to which the same distinguishing name as the distinguishing name (the region name of the user) of the image data at the time of print processing having been registered in advance. Thus also for printing indication from the remote host 51, via an application software or settings of the printer 102 etc., specific information of the Image forming instruction file 12 is converted into the distinguishing name to become the destination of outputting so that classification processing on the

print materials can be automatically executed under user separate fixing.

As described above, the fourth Embodiment of the present invention starts printing immediately after
5 indicating printing so that the prints will be ready when the user visits for example a developing laboratory to pick them up, and time can be spent efficiently. Moreover, with door-to-door delivery being designated, reception will become able to take
10 place at home or at an office etc., which will provide with further convenience.

(Fifth Embodiment)

The above described third Embodiment of the present invention was an operation system that in the
15 case where print request is executed from the host 51 by the user the printer 102 executes only download processing of the Image forming instruction file 12 and the image file 15 toward the host 51, and in the case where clear printing execution indication of the user
20 is executed by the panel operation etc., the print processing starts, and the above described fourth Embodiment of the present invention was an operation system that, in the case where print request is executed from the host 51 by the user, the printer 102
25 executes downloading of the Image forming instruction file 12 and the image file 15 toward the host 51, and at the same time when this downloading is completed,

the printing processing starts, but as in the fifth Embodiment of the present invention to be described as follows, such an operation system may be provided that, the user designates a storage destination of the Image forming instruction file 12 to be downloaded from the printer side so as to execute print request as well as printing indication, and the printer 102 executes download processing as well as print processing according to that indication.

In the fifth Embodiment of the present invention, only portions that are different from those in the third Embodiment (FIG. 54 and FIG. 55) will be described.

FIG. 54 shows an operation system for a user to execute a printing indication by designating the storage place of the image data of the remote host 51 with the panel part 104 of the printer 102 so that the printer 102 prints for outputting under user separate fixing mode according to that indication. FIG. 55 shows a processing procedure of that operation system.

At first, in FIG. 54, a host 51 with IP (Internet Protocol) address of "111.2.33.44" and a host 52 with IP address of "111.2.33.55" are constructed in the same LAN 54, and a server 57 with IP address of "222.33.4.111" and a printer 102 with IP address without clear description are constructed in the print service LAN 56. Moreover, the respective LAN 54 and 56

are brought into connection via the Internet 55.

Under such system, procedures for a user to designate the storage place of the image data 15 of the remote host 55 with the panel part 104 of the printer 102 to execute a printing indication and for the printer 102 to execute printing for outputting under user separate fixing mode according to that indication will be described as follows with reference to FIG. 55.

In FIG. 55, the user designates host information (IP address etc.) in which the image data for outputting are stored with panel operations etc. toward the printer 102. Moreover, the user ID (account name, password etc.) for accessing to that host is inputted and the storage place (directory) of the Image forming instruction file 12 is designated so that print request is executed to the printer 102 (S1201). In the example in FIG. 54, "111.2.33.44" is designated as the host information.

When the user requests printing, the printer 102 accesses to the remote host 51 designated by the user via the Internet 55 (S1202). According to information in the storage place of the instructed Image forming instruction file 12, the Image forming instruction file 12 that is stored in a predetermined format is searched and the found Image forming instruction file 12 is downloaded (S1203). When a predetermined Image forming instruction file has not been found at the time of

searching, an error message may be displayed on the panel 104 in order to notify the user of that unjust event.

5 The printer 102 completes downloading of a predetermined Image forming instruction file 12, and then displays a download completion message on the panel 104 in order to notify that downloading has been completed.

10 After completion of downloading of the Image forming instruction file 104, the user executes detailed print setting on the user interface 64 of the printer as shown in the above described FIG. 46 in the third Embodiment and executes printing indication (S1204). At that time, the printer 102 analyzes the
15 downloaded Image forming instruction file 12 (S1205) so as to supply with necessary information when the user is executing print setting, reflects the print setting changed by the user onto the Image forming instruction file 12.

20 In receipt of the printing execution indication from the user, the printer 102 accesses to the storage place of respective necessary image files according to a result of analysis of the Image forming instruction file 12 in S1205 (S1206) so as to execute download of
25 respective image files (S1207).

 The downloaded Image forming instruction file 12 as well as image files 15 are arranged to be stored in

a predetermined recording device allocated to each user. In the case where image files 15 are stored, staying conscious of the directory classification designated to the Image forming instruction file 12, storage takes place in such a construction that relative path of each image file 15 from the Image forming instruction file 12 will become the same as the destination of downloading. However, in the case where the same construction is impossible, the user is notified of that, or changed path subject to storage in a form that can be constructed may be reflected to the Image forming instruction file 12.

Thus, when downloading of all the image files is completed, the printer 102 prepares the printing job (S1208). At the time of preparation of the printing job, with the sheet discharging mode of the printer 102 being set at "user separate fixing" among print setting from the user, the "user separate fixing" mode is added to the sheet discharging designation of the printing job.

When the printing job generation is completed, the printer 102 starts print processing, and executes classification processing under "user separate fixing" mode as shown in FIG. 54 to print for outputting (S1209).

When the printing processing is completed, the printer 102 displays a printing completion message to

the panel 104 in order to notify the user that printing
is completed (S1210). At that time, information of
number of printing or the like that will become
information for settling the print service charge will
5 be notified additionally.

Incidentally, the printing indication of S1204 may
come after the processing of S1201 or may come after
S1207 if the print setting of the Image forming
instruction file 12 is not changed in particular.

10 As described above, in the fifth Embodiment of the
present invention, all the operations can be executed
on the image recording device 102, and even such a user
that does not have a personal computer or a mobile
terminal will become capable of taking an operable
15 mode. Moreover, designation equivalent to the Web
browser input which personal computers execute can be
executed from a panel 104 on the image recording device
102, and therefore a server 57 is not needed to be
provided in particular so that cost reduction will
20 become attainable.

(Variation 1 of Third to Fifth Embodiments)

In the above described third to fifth embodiments
of the present invention, printing execution indication
or printing reservation indication was executed from
25 the host computers 51 and 52 or the printer 102, but
printing execution indication or printing reservation
indication may be executed form outside equipments such

as a portable terminal etc. that is communicable with the Internet 55.

FIG. 56 shows an operation system for a user to execute printing execution indication or printing reservation indication from a portable terminal 67 so that the printer 102 executes a predetermined print processing according to that indication. In FIG. 56, the user executes the printing execution indication or the printing reservation indication of a predetermined print processing based on the Image forming instruction file 12 as well as the image file 15 stored in the host computer "111.2.33.44" from a portable telephone 67. That indication is notified to the printer 102 from the portable telephone 67 via a base station 68 and the Internet 55, and the printer 102 executes a predetermined download processing or print processing as the above described third to fifth embodiments.

Incidentally, the portable terminal 67 does not have to be a portable telephone, but anything will do if it is communicable with the base station 68, any communication means will do. In addition, it goes without saying that such an operation system that another (not shown) outside equipment is brought into connection with the tip of the portable terminal 67, and from that outside equipment, printing execution indication or print reservation indication is executed will do.

As described above, in the present example,
without any host computers 51 and 52, printing
execution indication or printing reservation indication
can be executed, and printing execution indication or
5 printing reservation indication can be executed from
the mobile terminal 67, and therefore without
preference in places, but printing execution indication
or printing reservation indication will become
executable from anywhere.

10 (Variation 2 of Third to Fifth Embodiments)

In the above described third to fifth Embodiments,
the server 57 constructed in the same LAN 56 as the
printer 102 was a server to control settings etc. of
the printer 102 and to provide the user with print
15 service with Web browser etc., but such a server that
provides the user with print service with Web browser
etc. or such a server that controls settings of a
printer does not have to be constructed in the same LAN
56 as the printer 102, servers to perform respective
20 functions do not have to be the same server, and
moreover, the server to provide the user with print
service with Web browser etc. may function as a relay
server to relay the communication processing between
the hosts 51 and 52 and the printer 102, and download
25 the Image forming instruction file 12 as well as the
image file 15 that the user made print reservation from
the host 51 to the storage region that the relay server

controls, and in the case where printer executed
printing indication, may be an operation system that
the printer downloads the Image forming instruction
file 12 as well as the image file 15 from the relay
5 server to execute print processing.

FIG. 57 shows such an operation system that the
server supplying with print service is not constructed
in the same LAN 56 as the printer 102. In FIG. 57, the
server "333.44.5.222" to provide the user with a print
10 service with the Web browser etc. shown in reference
numeral 69 is brought into communication connection
with the printer 102 or the hosts 51 and 52 via the
Internet 55 so as to function as a relay server to
relay the communication processing between the host 55
15 and the printer 102.

Under such a system, in receipt of the printing
reservation indication from the user in the host
"111.2.33.44" with reference numeral 51, the server
"333.44.5.222" with reference numeral 69 downloads the
20 Image forming instruction file 12 and the image file 15
from the host "111.2.33.44" with the reference numeral
51 to store them in the storage region which that
server 69 controls.

Thereafter, in the case where the user has
25 indicted printing execution from the side of the
printer 102, the printer 102 downloads the Image
forming instruction file 12 as well as the image file

15 of that user from the server "333.44.5.222" with
reference numeral 69 to execute print processing. On
the other hand, the server "222.33.4.111" with
reference numeral 57 that is constructed on the same
5 LAN 56 as the printer 102 and controls setting etc. of
the printer 102 executes setting on access to the relay
server "333.44.5.222" with reference numeral 69 toward
the printer 102 as well as setting of sheet discharging
means at the time of printing etc.

10 Thus, in the case where the host 51 executes the
printing reservation, storing the Image forming
instruction file 12 as well as the image file 15 to be
downloaded into the storage region that the relay
server 69 controls, the user changes the reception
15 place that he/she designated at the time of printing
reservation, and even when another printer 102 executes
printing indication, printing indication can be
executed from that another print 102 and from that
another printer 102 image outputting can be executed.

20 (Variation 3 of Third to Fifth Embodiments)

In the above described third to fifth Embodiments
of the present invention, the printer 102 receives the
printing request or printing reservation request from
the host 51 via the server 57 and the printing
25 indication etc. was controlled by the server 57, but
the printer 102 itself may have the function to receive
print request and printing reservation request from the

host 51 or control etc. of print setting etc. and be an operation system without server as shown in FIG. 58.

Thus, in the present example, since it is not necessary to provide a server, costs for the system
5 such as print service etc. can be reduced.

(Variation 4 of Third to Fifth Embodiments)

The above described third to fifth Embodiments of the present invention involved account name or electric mail address when the user ID is inputted, but the
10 printer may distinguish the user by insertion of information storage medium such as an ID card etc., in which a predetermined ID information is stored, into the printer to read in the inserted information storage medium.

15 In addition, the above described information storage medium may store not only user ID but also information such as host information as well as information of storage directory of Image forming instruction file, and the printer may be the one to
20 read out that information to access to a predetermined host and a predetermined directory.

Moreover, the above described storage medium may store the Image forming instruction file itself, and the printer may read out that information to access to
25 a predetermined host and a predetermined directory so as to start download processing as well as print processing of image files automatically from the

contents of the read out Image forming file.

Thus, in the present example, instead of user ID or password inputting, insertion of ID card will do, which will further simplify the user operation. In
5 addition, in order to enhance security, password may be inputted without exception.

(Variation 5 of Third to Fifth Embodiment)

In the above described third to fifth embodiment of the present invention, the user was supposed to
10 designate the host information (IP account etc.) at the time of print request, but if the printer can register host information as well as the user information, the host information as well as the user information is designated and registered only at the first time, at
15 the time of print requests for the second time and onward, designation of only the user information such as the user ID etc. may enable access automatically to the host that has been registered in advance.

In the case where only a specific printer is used,
20 print services can execute printing indication easily and is efficient.

In addition, as a registration contents to the printer, not only the designated host information but also information such as Image forming instruction file
25 storage destination inside that designated host etc. can be made to be registered, and for such a user that will store the Image forming instruction file only in a

specific directory, printing indication can be executed efficiently.

Thus, the present example enables registration of the user information so as to enable the utilizing user
5 for the second time and onwards to save time.

(Variation of Fifth Embodiment)

In the above described fifth Embodiment of the present invention, the user had to input for designation the path from the root directory of the
10 designated host in its entirety to the printer at the time of designating storage place (directory) of the Image forming instruction file stored in a remote host, but if the printer accesses to the designated host and is a printer which can display that directory class to
15 the user, it may involve the user to proceed with searching a desired Image forming instruction file from the root directory.

Thus, the present example only has to designate the host where Image forming instruction file exists
20 and will become able to save time for the user's inputting when to execute print request.

(Other Embodiments)

Incidentally, the present invention may be applied to a system constructed by a plurality of equipments
25 (such as a host computer, interface equipment, a reader and a printer etc.), or may be applied to a device (for example, photocopier and a facsimile device etc.)

consisting of one equipment.

In addition, it goes without saying that the purpose of the present invention is attainable by supplying a system or a device with recording medium
5 (storage medium) that has recorded program codes of a software to realize the functions of the above described embodiment so that the computer (or CPU and MPU) of that system or device reads out program codes stored in the recording medium for execution.

10 In this case, the program codes themselves that were read out from the recording medium will realize the functions of the above described embodiments, and the recording medium that recorded that program codes will construct the present invention.

15 As the recording medium to record that program codes and the variable data such as a table etc., for example, a floppy disk (FD), a hard disk, an optical disk, an optical magnetic disk, a CD-ROM, a CD-R, a magnetic tape, non-volatile memory card (IC memory
20 card) and a ROM etc. can be used.

In addition, it goes without saying that, by executing the program codes that the computer reads out, not only functions of the above described embodiments are realized, but also such a case that,
25 based on indications of that program code, the OS (operating system) etc. that is operating on the computer executes a part or all of the actual

processing is included.

As having been described so far, according to the present invention, irrespective of existence or lack of a host computer, for printing from a storage device on
5 an outside device such as a digital camera etc., and printing from storage medium such as a memory card etc., printing indications such as sheet discharging selection or the like will be made executable from an existing devices such as a digital camera and a
10 printing device etc. so as to enable realization of automatic sheet discharging methods fulfilling the needs of users and enhancement of efficiency in various classifying operation such as classification of printed materials for personal use, and in classification for
15 each client in the print service work.

In addition the present invention enables to request printing for a necessary copies on necessary items from home or anywhere without limitation on places by adding the image data storage place, the
20 print destination, the number of print, the sheet discharging method, the reception method and the payment method for charges etc. to electronic information to execute communication between image recording devices such as printer etc. and outside
25 devices such as a personal computer, a mobile terminal and a digital camera etc. in print services such as printing etc., so as to be interpretable with an image

recording device.

Moreover, as for reception, the present invention will enable to provide users with a mode of service fulfilling his/her needs by enabling designation of neighborhood of a residence or a place nearby the traveling destination (convenience store, developing laboratory, personal computer shop etc.) where the image recording device is installed or door-to-door delivery etc. by designating the reception place so as to enable reception at place and by method convenient to users and saving time for clients to request print services, thus providing users with a mode of service fulfilling his/her needs.

Moreover, in the present invention, all print indications are stored in electronic information, and shop clerks who conduct printing will not have to execute elections of images etc. by way of memo to save time for printing operation, enabling to enhance efficiency in printing services.

In addition, according to the present invention, without executing any indications from the host computer, in direct printing from a host computer on a network or a storage medium on an outside device such as a digital camera etc., printing indications such as sheet discharging selection or the like will be made executable from an existing devices such as a digital camera and a printing device etc. so as to enable

realization of automatic sheet discharging methods
fulfilling the needs of users and enhancement of
efficiency in various classifying operation such as
classification of printed materials for personal use,
5 and in classification for each client in the print
service work.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999
1000
1001
1002
1003
1004
1005
1006
1007
1008
1009
1010
1011
1012
1013
1014
1015
1016
1017
1018
1019
1020
1021
1022
1023
1024
1025
1026
1027
1028
1029
1030
1031
1032
1033
1034
1035
1036
1037
1038
1039
1040
1041
1042
1043
1044
1045
1046
1047
1048
1049
1050
1051
1052
1053
1054
1055
1056
1057
1058
1059
1060
1061
1062
1063
1064
1065
1066
1067
1068
1069
1070
1071
1072
1073
1074
1075
1076
1077
1078
1079
1080
1081
1082
1083
1084
1085
1086
1087
1088
1089
1090
1091
1092
1093
1094
1095
1096
1097
1098
1099
1100
1101
1102
1103
1104
1105
1106
1107
1108
1109
1110
1111
1112
1113
1114
1115
1116
1117
1118
1119
1120
1121
1122
1123
1124
1125
1126
1127
1128
1129
1130
1131
1132
1133
1134
1135
1136
1137
1138
1139
1140
1141
1142
1143
1144
1145
1146
1147
1148
1149
1150
1151
1152
1153
1154
1155
1156
1157
1158
1159
1160
1161
1162
1163
1164
1165
1166
1167
1168
1169
1170
1171
1172
1173
1174
1175
1176
1177
1178
1179
1180
1181
1182
1183
1184
1185
1186
1187
1188
1189
1190
1191
1192
1193
1194
1195
1196
1197
1198
1199
1200
1201
1202
1203
1204
1205
1206
1207
1208
1209
1210
1211
1212
1213
1214
1215
1216
1217
1218
1219
1220
1221
1222
1223
1224
1225
1226
1227
1228
1229
1230
1231
1232
1233
1234
1235
1236
1237
1238
1239
1240
1241
1242
1243
1244
1245
1246
1247
1248
1249
1250
1251
1252
1253
1254
1255
1256
1257
1258
1259
1260
1261
1262
1263
1264
1265
1266
1267
1268
1269
1270
1271
1272
1273
1274
1275
1276
1277
1278
1279
1280
1281
1282
1283
1284
1285
1286
1287
1288
1289
1290
1291
1292
1293
1294
1295
1296
1297
1298
1299
1300
1301
1302
1303
1304
1305
1306
1307
1308
1309
1310
1311
1312
1313
1314
1315
1316
1317
1318
1319
1320
1321
1322
1323
1324
1325
1326
1327
1328
1329
1330
1331
1332
1333
1334
1335
1336
1337
1338
1339
1340
1341
1342
1343
1344
1345
1346
1347
1348
1349
1350
1351
1352
1353
1354
1355
1356
1357
1358
1359
1360
1361
1362
1363
1364
1365
1366
1367
1368
1369
1370
1371
1372
1373
1374
1375
1376
1377
1378
1379
1380
1381
1382
1383
1384
1385
1386
1387
1388
1389
1390
1391
1392
1393
1394
1395
1396
1397
1398
1399
1400
1401
1402
1403
1404
1405
1406
1407
1408
1409
1410
1411
1412
1413
1414
1415
1416
1417
1418
1419
1420
1421
1422
1423
1424
1425
1426
1427
1428
1429
1430
1431
1432
1433
1434
1435
1436
1437
1438
1439
1440
1441
1442
1443
1444
1445
1446
1447
1448
1449
1450
1451
1452
1453
1454
1455
1456
1457
1458
1459
1460
1461
1462
1463
1464
1465
1466
1467
1468
1469
1470
1471
1472
1473
1474
1475
1476
1477
1478
1479
1480
1481
1482
1483
1484
1485
1486
1487
1488
1489
1490
1491
1492
1493
1494
1495
1496
1497
1498
1499
1500
1501
1502
1503
1504
1505
1506
1507
1508
1509
1510
1511
1512
1513
1514
1515
1516
1517
1518
1519
1520
1521
1522
1523
1524
1525
1526
1527
1528
1529
1530
1531
1532
1533
1534
1535
1536
1537
1538
1539
1540
1541
1542
1543
1544
1545
1546
1547
1548
1549
1550
1551
1552
1553
1554
1555
1556
1557
1558
1559
1560
1561
1562
1563
1564
1565
1566
1567
1568
1569
1570
1571
1572
1573
1574
1575
1576
1577
1578
1579
1580
1581
1582
1583
1584
1585
1586
1587
1588
1589
1590
1591
1592
1593
1594
1595
1596
1597
1598
1599
1600
1601
1602
1603
1604
1605
1606
1607
1608
1609
1610
1611
1612
1613
1614
1615
1616
1617
1618
1619
1620
1621
1622
1623
1624
1625
1626
1627
1628
1629
1630
1631
1632
1633
1634
1635
1636
1637
1638
1639
1640
1641
1642
1643
1644
1645
1646
1647
1648
1649
1650
1651
1652
1653
1654
1655
1656
1657
1658
1659
1660
1661
1662
1663
1664
1665
1666
1667
1668
1669
1670
1671
1672
1673
1674
1675
1676
1677
1678
1679
1680
1681
1682
1683
1684
1685
1686
1687
1688
1689
1690
1691
1692
1693
1694
1695
1696
1697
1698
1699
1700
1701
1702
1703
1704
1705
1706
1707
1708
1709
1710
1711
1712
1713
1714
1715
1716
1717
1718
1719
1720
1721
1722
1723
1724
1725
1726
1727
1728
1729
1730
1731
1732
1733
1734
1735
1736
1737
1738
1739
1740
1741
1742
1743
1744
1745
1746
1747
1748
1749
1750
1751
1752
1753
1754
1755
1756
1757
1758
1759
1760
1761
1762
1763
1764
1765
1766
1767
1768
1769
1770
1771
1772
1773
1774
1775
1776
1777
1778
1779
1780
1781
1782
1783
1784
1785
1786
1787
1788
1789
1790
1791
1792
1793
1794
1795
1796
1797
1798
1799
1800
1801
1802
1803
1804
1805
1806
1807
1808
1809
1810
1811
1812
1813
1814
1815
1816
1817
1818
1819
1820
1821
1822
1823
1824
1825
1826
1827
1828
1829
1830
1831
1832
1833
1834
1835
1836
1837
1838
1839
1840
1841
1842
1843
1844
1845
1846
1847
1848
1849
1850
1851
1852
1853
1854
1855
1856
1857
1858
1859
1860
1861
1862
1863
1864
1865
1866
1867
1868
1869
1870
1871
1872
1873
1874
1875
1876
1877
1878
1879
1880
1881
1882
1883
1884
1885
1886
1887
1888
1889
1890
1891
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901
1902
1903
1904
1905
1906
1907
1908
1909
1910
1911
1912
1913
1914
1915
1916
1917
1918
1919
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
1933
1934
1935
1936
1937
1938
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
2048
2049
2050
2051
2052
2053
2054
2055
2056
2057
2058
2059
2060
2061
2062
2063
2064
2065
2066
2067
2068
2069
2070
2071
2072
2073
2074
2075
2076
2077
2078
2079
2080
2081
2082
2083
2084
2085
2086
2087
2088
2089
2090
2091
2092
2093
2094
2095
2096
2097
2098
2099
2100
2101
2102
2103
2104
2105
2106
2107
2108
2109
2110
2111
2112
2113
2114
2115
2116
2117
2118
2119
2120
2121
2122
2123
2124
2125
2126
2127
2128
2129
2130
2131
2132
2133
2134
2135
2136
2137
2138
2139
2140
2141
2142
2143
2144
2145
2146
2147
2148
2149
2150
2151
2152
2153
2154
2155
2156
2157
2158
2159
2160
2161
2162
2163
2164
2165
2166
2167
2168
2169
2170
2171
2172
2173
2174
2175
2176
2177
2178
2179
2180
2181
2182
2183
2184
2185
2186
2187
2188
2189
2190
2191
2192
2193
2194
2195
2196
2197
2198
2199
2200
2201
2202
2203
2204
2205
2206
2207
2208
2209
2210
2211
2212
2213
2214
2215
2216
2217
2218
2219
2220
2221
2222
2223